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9333.3 - PRODUCTION COSTS  
(Schedule 19)

Table of Contents

- .01 Purpose
- .02 Objective
- .03 Reserved
- .04 Responsibilities
- .05 Reserved
- .06 Policy
- .07 Background
  
- .3 Production Costs
  - .31 Cost Allowance Principles
    - A. Tree to Pond Costs
      - 1. Procedures
        - a. Cost Tables
        - b. Field Data Accuracy
      - 2. Scope
    - B. Manufacturing Costs
      - 1. Procedures
      - 2. Scope
  - .32 Falling and Bucking
    - A. Merchantable Trees
    - B. Non-merchantable Trees and Snags
    - C. Commercial Thinnings
  - .33 Rigging, Yarding and Loading
    - A. Move-in
    - B. Rigging
      - 1. Mobile Yarder-Loader
    - C. Yarding
      - 1. Yarding Cost
      - 2. Yarding Distance
    - D. Loading
    - E. Tractor
      - 1. Western Oregon - Yarding
      - 2. Western Oregon - Loading
      - 3. Western Oregon - Partial Cut Operations
      - 4. Eastern Oregon - Yarding
      - 5. Eastern Oregon - Loading
    - F. High Lead
      - 1. Western Oregon - Yarding
      - 2. Western Oregon - Portable Tower Yarding
      - 3. Western Oregon - High Lead Loading

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9333.3 - PRODUCTION COSTS  
(Schedule 19)

- G. Skyline
  - 1. Western Oregon - Static Skyline Yarding
  - 2. Western Oregon - Skyline Loading
- H. Commercial Thinning
  - 1. Western Oregon - Yarding
  - 2. Western Oregon - Loading
- I. (Reserved)
- J. (Reserved)
- K. Small Operations
  - 1. Type Operations
  - 2. Small Mobile Loader With Yarding Tractor
  - 3. Light Yarder-Loader Operations
- L. Other Allowances
  - 1. Swinging
  - 2. Cold Deck Loading
  - 3. Gross Yarding (Cull Material)
- M. Factor Determination
  - 1. Yarding Distances
- .34 Transportation
  - A. Standard Method
    - 1. Cost Factors
    - 2. Clocking Procedure
    - 3. Number of Observations Required
  - B. Alternate Method
    - 1. Cost Factors
    - 2. Clocking Procedure
- .35 Road Construction and Maintenance
  - A. Engineering
  - B. Move-in
  - C. Clearing and Grubbing
    - 1. Acreage Determination
    - 2. Grubbing
    - 3. Clearing
  - D. Excavation
    - 1. Common Excavation - Per Yard
    - 2. Rock Excavation - Per Yard
    - 3. Common Excavation - Per Station
    - 4. Rock Excavation - Per Station
    - 5. Turnout Excavation
    - 6. Drift Allowance
    - 7. Excavation and End Haul
    - 8. Shovel Excavation
  - E. Culverts
  - F. Grading



- G. Surfacing
  - 1. Cost Factors
  - 2. Material Volume Determination
- H. Road Maintenance
  - 1. Cost Factors
    - a. Surfaced Roads
    - b. Unsurfaced Roads
    - c. Other Allowances
  - 2. Machine Rate Determination
- .36 Fire Protection and Hazard Reduction
  - A. Fire Protection
  - B. Hazard Reduction
- .37 Other Allowances
  - A. Seeding and Planting (Eastern Oregon)
  - B. Stream Clearing
- .38 Western Oregon Manufacturing
  - A. Douglas-fir
    - 1. Weights by Manufacture
    - 2. Thinning
    - 3. Plywood, Lumber and Chip
    - 4. Lumber and Chip
    - 5. Plywood and Chip
    - 6. Plywood Sheathing
  - B. Associated Species
    - 1. Thinnings
    - 2. Hemlock Lumber and Chip
    - 3. True fir and Cedar Lumber and Chip
  - C. Manufacturing Cost Report
- .39 Eastern Oregon Manufacturing
  - A. Pines and Associated Species
  - B. Lodgepole Pine
  - C. Manufacturing Cost Report

### Illustrations

- 1. 9333.32 - Falling and Bucking
  - Table 1. Merchantable Tree - Western Oregon
  - 2. Merchantable Tree - Eastern Oregon
  - 3. Non-merchantable Tree & Snag Felling - Western Oregon
  - 4. Non-merchantable Tree & Snag Felling - Eastern Oregon
  - 5. Commercial Thinnings
- 2. 9333.33 - Rigging, Yarding and Loading
  - Table 1. Move-in Logging Equipment - Western Oregon
  - 2. Move-in Logging Equipment - Eastern Oregon
  - 3. Yarding & Loading - Tractor Operations - Western Oregon
  - 4. Tractor Yarding - Western Oregon
  - 5. Loading - Tractor Operations - Western Oregon
  - 6. Yarding & Loading - Partial Cut Tractor Operations - Western Oregon

9333.3 - PRODUCTION COSTS  
(Schedule 19)

- A. Yarding Distance in Feet
- B. Merchantable Stems Marked Per Acre
- 7. Partial Cut Yarding - Tractor Operations - Western Oregon
  - A. Yarding Distance in Feet
  - B. Merchantable Stems Marked Per Acre
- 8. Loading - Partial Cut Tractor Operations - Western Oregon
  - A. Yarding Distance in Feet
  - B. Merchantable Stems Marked Per Acre
- 9. Tractor Rigging - Western Oregon
- 10. Yarding & Loading - Tractor Operations - Eastern Oregon
- 11. Tractor Yarding - Eastern Oregon
- 12. Loading - Tractor Operations - Eastern Oregon
- 13. Tractor Rigging - Eastern Oregon
- 14. Yarding & Loading - High Lead Operations - Western Oregon
- 15. High Lead Yarding - Western Oregon
- 16. Loading - High Lead Operations - Western Oregon
- 17. High Lead Rigging - Western Oregon
- 18. Portable Tower Yarding and Loading - 65' Tractor-Mounted Tower  
Western Oregon
- 19. Portable Tower Yarding - 65' Tractor-Mounted Tower -  
Western Oregon
- 20. Portable Tower Yarding and Loading - 110' Trailer-Mounted  
Tower - Western Oregon
- 21. Portable Tower Yarding - 110' Trailer-Mounted Tower -  
Western Oregon
- 22. Portable Tower Loading Costs - Western Oregon
- 23. Skyline Rigging - Static Skyline - Western Oregon
- 24. Static Skyline - Yarding and Loading - Portable Tower  
in Clear Cuts - Western Oregon
  - A. Yarding Distance - 500' to 1800'
  - B. Yarding Distance - 1900' to 3200'
- 25. Static Skyline - Yarding - Portable Tower in Clear Cuts  
Western Oregon
  - A. Yarding Distance - 500' to 1800'
  - B. Yarding Distance - 1900' to 3200'
- 26. Swinging and Loading - High Lead Hot Deck Swinging -  
Western Oregon
- 27. High Lead Hot Deck Swinging - Western Oregon
- 28. Swing Pole Rigging - Western Oregon
- 29. Cold Deck Swinging - Western Oregon
- 30. Cold Deck Loading - Western and Eastern Oregon
- 31. Mobile Loader - Rigging and Loading - Western and  
Eastern Oregon
- 32. Yarding by Light Yarder-Loader - Western Oregon
- 32A. Yarding by Light Yarder-Loader - Eastern Oregon
- 33. Light Yarder-Loader - Rigging and Loading - Western  
and Eastern Oregon
- 34. Yarding with Crawler Tractor - Commercial Thinnings -  
Western Oregon
- 35. Yarding with Rubber-Tired Skidder - Commercial Thinnings -  
Western Oregon
- 36. Loading - Commercial Thinnings - Western Oregon
- 37. Rigging - Commercial Thinnings - Western Oregon



3. 9333.34 - Transportation

Table 1. Log Truck Hauling Rates

2. "Example" - Hauling Cost Computation

A. Standard Method

B. Alternate Method

4. 9333.35 - Road Construction and Maintenance

Table 1. Engineering Costs - Eastern and Western Oregon

2. Equipment Move-in

3. Clearing and Grubbing

4. Excavation per Cubic Yard

5. Excavation per Station - 14' Subgrade - (10' Usable Width) - Common and Rock

6. Excavation per Station - 20' Subgrade - (12' Usable Width) - Common and Rock

7. Excavation per Turnout - 14' Subgrade (10' Usable Width) Common and Rock

8. Excavation per Turnout - 20' Subgrade (12' Usable Width) Common and Rock

9. Allowance for Drift Beyond 100'

10. Excavation and End Haul

11. Shovel Excavation

12. Shovel Loading - Bank to Truck

13. Riveted and Helically Corrugated Round Pipe (Culvert)

14. Standard Riveted Pipe Arch (Culvert)

15. Structural Plate Round Pipe (Culvert)

16. Structural Plate Pipe Arch (Culvert)

17. Perforated Culvert Pipe

18. Grading (Per 100' Station)

19. Surfacing

20. Road Maintenance (Blacktop, Gravel and Unsurfaced Roads)

5. 9333.36 - Fire Protection and Hazard Reduction

Table 1. Fire Protection - By Size of Tract

2. Fire Line Construction - Western Oregon

3. Slash Burning - Western Oregon

A. Dollars per MBF

B. Dollars per Acre

6. 9333.37 - Other Allowances

Table 1. Forest Development - Eastern Oregon

7. 9333.38 - Western Oregon Douglas-fir Manufacturing

Table 1. Weights by Manufacture

2. Thinnings

3. Plywood, Lumber and Chip Manufacturing Costs per M - Net Log Scale

4. Lumber and Chip Manufacturing Costs per M - Net Log Scale

5. Plywood and Chip Manufacturing Costs per M - Net Log Scale

8. 9333.38 - Western Oregon Associated Species Manufacturing

Table 1. Thinnings

2. Hemlock - Lumber and Chip Manufacturing Costs Per M - Net Log Scale

3. True Firs, Cedars - Lumber and Chip Manufacturing Costs Per M - Net Log Scale

9333.3 - PRODUCTION COSTS  
(Schedule 19)

9. 9333.39 - Eastern Oregon Manufacturing

Table 1. Pines and Associated Species - Lumber and Chip  
Manufacturing Costs Per M - Net Log Scale

2. Lodgepole Pine



9333.3 - PRODUCTION COSTS  
(Schedule 19)

.01 Purpose. This supplement contains cost data and guidelines used in estimating production costs for timber appraisals. Information in this release is intended for internal use by the Bureau of Land Management in Oregon and Washington. Its applicability for use by others or for other than appraising BLM timber tracts in Oregon and Washington is not implied. Further, any valid comparisons with empiric or "average" costs must give full consideration to the data sources and assumptions used in this supplement.

.02 Objectives. The schedule is designed to provide a systematic approach for field appraisers to model production costs of the "Average Operator". It presents necessary data to accurately estimate all costs incurred in the conversion process from the standing tree to the finished product. Cost tables and backup data detail provides the appraiser an opportunity to use cost tables directly, when appropriate, or to make adjustments to compensate for special or unusual conditions. Field appraisers must have familiarity with the schedule's composition and its development in order to adequately estimate costs as used in the BLM appraisal concept and reflected in this supplement.

.03 (Reserved)

.04 Responsibilities. Primary responsibilities relating to the development and updating of this facet of the appraisal system include:

A. The State Director is responsible for administration of the appraisal system including:

1. Identification of cost areas needing revisions, modification and updating.
2. Assignment and scheduling of cost data collections, analysis and computations.
3. Assembling, publishing and implementation of cost schedules.
4. Developing methodology for obtaining and analyzing cost data and time studies.
5. Producing cost tables by automatic data processing from operating rates and time study data.
6. Reviewing cost data and schedule revisions for technical adequacy.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

B. The District Manager is responsible for preparing accurate appraisals including:

1. Making continuing review of cost schedules and recommending revisions and modifications as needed.
2. Collecting, analyzing and compiling local cost data as assigned.
3. Development of procedures, including backup cost data and cost tables for local conditions to meet appraisal situations unique to an individual district.
4. Testing existing and revised cost schedules for appropriateness to local conditions.

.05 (Reserved)

.06 Policy. Cost data used in this schedule is current to the extent possible. Cost tables are representative of current conditions relative to BLM time studies and within the context of the BLM standard appraisal system. For example, costs in this schedule do not include any profit or risk to the purchaser or his contractors except for materials or services purchased on the local market. Profit and risk allowances in BLM appraisals are based on product selling value, except for road construction risk, and are computed as a separate component of the appraisal formula. Primary cost items, i.e., wage and machine rates for logging and lumber manufacturing are reviewed at least annually, and updated when a cost change is indicated. Plywood manufacturing costs are changed annually based on industry cost records. Cost tables and related information in this supplement are used to appraise all BLM timber offered for competitive sales; unless, the appraiser finds evidence such costs are not representative of conditions for the individual tract. Adjustments to reflect representative conditions or to cover special or unusual situations are documented in the appraisal file. Limits and bases for making such adjustments are determined by the District Manager and his district cruiser/appraiser staff.

.07 Background. This is the nineteenth BLM logging cost schedule for Oregon-Washington; thus, it is designated "Schedule 19. It is a composite of cost data collected by district cruiser/appraiser staffs applied to time studies of various ages conducted by BLM in Oregon. It is issued as an Oregon State Office Supplement as it pertains entirely to Oregon-Washington. Two major categories are covered--(Logging (tree to pond) and Manufacturing (lumber and plywood) costs. The release is made up of three components:



9333.3 - PRODUCTION COSTS  
(Schedule 19)

1. Descriptive and procedural text.
2. Cost tables - listed as illustrations.
3. Basic cost and time study data - recorded in the appendices.

The basic cost and time study data (appendices) are used in the development of the cost tables (Illustrations). Illustrations and appendices will be revised as cost data is updated and changed. District office manual supplements may be issued as needed to reflect generalized local conditions and record costs common to an individual district.





9333.3 - PRODUCTION COSTS  
(Schedule 19)

.31 Cost Allowance Principles. Each tract of timber has its own characteristics. A timber appraisal must reflect the consideration of these characteristics such as quality and quantity of the timber, features of topography, and tract location relative to road and manufacturing facilities. The schedule furnishes a systematic means to estimate local and specific costs relative to characteristics of each specific tract.

A. Tree to Pond Costs cover falling and bucking, rigging, yarding and loading, transportation and other contractual costs associated with harvesting the specific tract of timber. Costs concerned with those activities are estimated from this schedule on the basis of field information and factors collected by the appraiser.

1. Procedure. Cost tables for the various activities are compiled from operational rates (computed from wage and machine costs obtained from industry and equipment company sources) as applied to BLM time-cost studies. Time/cost studies for the timber harvesting functions were conducted over the past several years. The studies furnished times required to perform a specific job, including normal delay and lost time on the job. The times relate to certain measurable variables affecting rate of production. There are scores of combinations of variables which affect the individual timber harvest function. Many are difficult or impossible to measure. Thus, only measurable variables, considered important which could be isolated and measured are used. Others are accounted for through their inter-relationship with those evaluated and as used in averages for the samples taken.

a. Cost Tables. Cost tables in Illustrations 1 through 6 were prepared through use of production rates determined largely by BLM time studies as noted before. In a few cases where extrapolation of original data produced unrealistically low results, minimum costs were established. Some data were supplied by the Pacific Northwest Forest and Range Experiment Station and BLM records of actual costs. Information used to compute machine ownership rates were furnished by machine manufacturers and operators using the particular piece of equipment. Machine operating costs were calculated from purchase prices and operating expenses furnished by local timber industry sources as well as by manufacturers and distributors of equipment and supplies. Machine rental rates were obtained from published schedules of the Federal Highway Administration and local rental companies. Basic wage rate data were obtained from local timber industry sources and cover union and non-union, company and contract loggers. There were many and varied reliable sources for wage rate adjustment items such as social security, industrial accident insurance, general and administrative cost, etc.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

b. Field Data Accuracy. The necessity for accuracy and reasonableness in obtaining field data by the appraiser is paramount. Laxity in obtaining such data or indiscriminate use of the cost schedule can result in inaccurate answers which are impossible, or at the best, difficult to detect. Cost estimates resulting from the use of this schedule are no better than the field data collected for use in the appraisal.

2. Scope. The cost tables are representative of the normal range of logging and road construction conditions. If the appraiser encounters unusual conditions, he should use the basic data in the appropriate appendices. The basic unit of volume for which costs are expressed is one thousand board feet as described by the Scribner log rule based on taper measurements made at 16' intervals on the stem of the tree.

B. Manufacturing costs cover producing and marketing the common items of lumber and plywood and chips. Costs are estimated on the bases of species, log sizes, and proportion of lumber and plywood produced for each specific tract.

1. Procedure. Lumber manufacturing costs are developed by applying modeled operating costs for an "Average Mill" to production data from time studies conducted by BLM in western Oregon mills similar to the average mill. The costs reflect the installation and operation of new mill equipment first priced in 1966 and subsequently updated as needed. Current wage rates are applied as needed after annual reviews. Plywood manufacturing costs are obtained from the American Plywood Association and are also updated as required after annual review.

2. Scope. The cost tables in Illustrations 7 through 9 are based on average industry use reflected in recovery and time studies. Should the appraiser encounter unusual log sizes or use standards, appropriate adjustments will be required. Such adjustments will be made under direction of the District Cruiser/Appraiser.

.32 Falling and Bucking.

A. Merchantable Tree.

1. Western Oregon - Cost table, Illustration 1. Table 1 for falling and bucking in western Oregon is based on time studies made under varying conditions of brush, weather, slope, etc. These costs reflect cutting in the normal woods run log lengths. Payment to the men falling and bucking the timber where the time studies were conducted was both by the hour and by the thousand board feet. Consequently, average payments have been reduced to an hourly wage basis for application. The following nine variables were analyzed to determine the effect of each on the falling and bucking time:



# 9333.3 - PRODUCTION COSTS (Schedule 19)

D.B.H.  
 Number of 16' logs  
 Number of 16' logs squared  
 Number of 16' logs cubed  
 Gross volume  
 Slope in percent  
 Percentage of top loss  
 Percentage of bottom and top loss  
 Merchantable sized stems per acre (includes culls and snags)

However, only number of 16' logs, number of 16' logs squared, percentage of top loss, and stems of merchantable size per acre proved to be significant. A very strong relationship existed between those variables and the time required for falling and bucking a thousand board feet of gross tree volume. Apparently the d.b.h. was not significant in this analysis because of the close correlation between it and the other variables. Thus, the cost table is worked out to show the relationship between cost per MBF gross volume and tree height, percent top loss, and stems per acre. Studies in windfall log making indicate that costs are quite comparable to log making in standing timber. Therefore, normal falling and bucking costs should be used for log making in windfall.

2. Eastern Oregon - Cost table, Illustration 1. Table 2 is not based on time studies but rather on the cost per thousand board feet paid to fallers by industry in that area. This is in keeping with the Bureau of Land Management method of harvesting pine and associated species whereby the size of the trees, which are generally mature and overmature, do not vary greatly on the average as well as with the method of payment for this function.

## B. Non-merchantable Trees and Snags.

1. Western Oregon - Illustration 1, Table 3, may be used with individual tree d.b.h. or with an average d.b.h. where necessary. Measurements from which this table was made were taken on the perimeter of the tree, with or without bark. Therefore, to use the table, measurements should be made in the same manner. Where it is necessary to fall trees with a smaller diameter than is listed in the table--hardwoods, for example--use the cost of falling unmerchantable snags for the smallest diameter listed.

2. Eastern Oregon - Illustration 1, Table 4 was developed by computing a differential wage rate for eastern Oregon falling, and applying this adjusted wage to western Oregon time study data. To use this table, field measurements should be made in the manner described.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

C. Commercial Thinnings (Western Oregon). Illustration 1, Table 5, costs were developed for Bureau of Land Management use from U. S. Forest Service Research Paper PNW-41 (1967), Production Rates in Commercial Thinning of Young Growth Douglas-fir, by Thomas C. Adams of the Pacific Northwest Forest and Range Experiment Station.

1. Merchantable Trees. Illustration 1, Table 5 uses d.b.h. and number of 16' logs to a 6" top as variables. This is in contrast to the volume tables used by BLM for thinning sales, which are based on form class, d.b.h., 5" top d.i.b. and total height. Thus, in order to use Table 5, the timber cruiser must have some data on tree heights in terms of 16' logs. There are three optional methods of application:

a. Determine, from the cruise data, the average form class, average total height and corresponding average volume to a 5" top. In the form class volume table used for thinnings, look up the d.b.h. which most nearly corresponds to the average Scribner board foot volume. Then apply the formula:

$$N = \frac{H - L_u (H - 16.3)}{16.3} \frac{1}{}$$

Where: N = Number of 16' logs in tree to 5" top  
 H = Total height of tree in feet from stump to tip  

$$L_u = \frac{5/d_1(0.51)}{1-5/d_1(0.49)}$$

in which:

$$d_1 = \text{diameter inside bark at top of first 16' log (found by multiplying d.b.h.o.b. by form class)}$$

After thus computing the number of 16' logs in the average tree, find the corresponding falling and bucking cost per tree in Table 5 and divide this cost in dollars by the average tree gross volume expressed in M bd. ft. Scribner log rule. Finally, adjust for defect and breakage.

Example:

Given an average form class of 80 and an average total height of 120' above stump. The 100 percent cruise indicates a total gross volume of 1,260 M bd. ft. in 4,065 trees. Then,

Gross volume of average tree =  $1,260,000 \div 4,065 = 310$  bd. ft.

In the thinning volume table, form class 80, the volume of a tree of 120' total height most closely approaching that of the average tree is 303 bd. ft. The corresponding d.b.h. is 16".



9333.3 - PRODUCTION COSTS  
(Schedule 19)

The formula is applied as follows:

$$N = \frac{120 - L_u(120-16.3)}{16.3} ;$$

$$d_1 = 16 \times .80 = 12.8, \text{ and}$$

$$L_u = \frac{5/12.8 \times 0.51}{1-(5/12.8 \times 0.49)} = .25; \text{ substituting,}$$

$$N = \frac{120 - .25(120-16.3)}{16.3} = 5.8, \text{ rounded to 6 logs}$$

per average tree.

Thus, the average tree is 16" d.b.h. and six 16' logs to a 5" top. The cost of falling and bucking this tree, from Table 5, is \$ 3.30. On a per M basis, the cost is:

$$\frac{\$3.30}{.310 \text{ M (volume of average tree)}} = \$ \underline{\underline{10.65}}.$$

per M bd. ft. gross volume.

This cost must be adjusted for net recovery. Assuming that, in this example, the cruise data show a total defect and breakage of five percent, the cost per M bd. ft. net volume is:

$$\frac{\$10.65}{.95} = \$ \underline{\underline{10.12}} \text{ for falling and bucking}$$

merchantable trees.

b. The second method can be used advantageously for a sample cruise or a 100 percent cruise of small volume. While this procedure is basically the more accurate, it may be more time consuming if manual processing must be done, as is now the case for commercial thinning data. This method will be entirely feasible after commercial thinning cruise data have been computerized. Briefly, the second option involves calculating the total cost of falling and bucking all merchantable trees in the sample (or all merchantable trees in the total population in the case of a 100 percent cruise). This total cost is divided by the total net merchantable volume to yield the falling and bucking cost per M for use in the appraisal.

Example:

Given a 20 percent sample cruise, with a net merchantable volume of 195 M bd. ft. in the sample. Heights in 16' logs of all 645 trees in the sample are tallied during cruising, and sample cruise data tabulated as follows:

9333.3 - PRODUCTION COSTS  
(Schedule 19)

D.B.H. Inches	No. of 16-foot Logs	No. of Trees	Fall. & Buck. Cost per Tree Table	Total Fall. & Buck. Cost
8	1	5	\$ 1.55	\$ 7.75
	2	16	1.55	24.80
	3	9	2.00	18.00
	4	2	2.00	4.00
10	1	8	1.70	13.60
	2	17	1.70	28.90
	3	20	2.15	43.00
	4	5	2.15	10.75
	5	2	2.60	5.20
Etc.				
26	4	6	4.70	28.20
	5	11	5.15	56.65
	6	7	5.15	36.05
	7	2	5.60	11.20
30	5	2	6.15	12.30
	6	3	6.15	18.45
	8	1	6.60	6.60
Totals		645 Trees		\$ <u>1,744.41</u>

The falling and bucking cost on a net volume basis is then:

$$\frac{\$1,744.41}{195 \text{ M bd. ft. net}} = \$8.95/\text{M for falling and bucking merchantable trees.}$$

c. A third method can be used in lieu of either first two options. This procedure is basically as accurate as the first two methods, but is less time consuming than either method. The third option eliminates the formula and relevant calculation used in method number one. The formula calculations are replaced by Chart 1. Chart 1 shows the number of logs to a 5" top in a tree of known total height, d.b.h., and form class. It is constructed by using total height as one variable and d.i.b. top first 16' log as the other variable.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

.32C1c

Calculations for Average Log & Falling & Bucking Costs

1	2	3	4	5	6	7	8
DBH Inches	DBH x FC 2 inch - class	Total Height Feet	No. of 16- foot lgs/tree	No. of Trees	Total No. Logs	Fall & Buck Cost/Tree Table	Total Fall & Buck Cost
8	6	60	2	49	98	\$1.55	\$
		70	2	59	118		\$ 210.80
		80	2	28	56		
10	8	70	3	15	45	2.15	
		80	3	68	204		322.50
		90	3	67	201		
12	10	70	3	4	12	2.35	
		80	4	33	132		
		90	4	62	248		385.40
		100	4	65	260		
		110	5	37	185	2.80	103.60
etc.							
=====							
22	18	130	7	12	84	4.75	
		140	7	15	105		
		150	8	29	232		351.50
		160	8	18	144		
Total				1042	4929		\$2,747.60

Explanation

Col. 2. Form class is 82. DBH x FC is rounded off to nearest 2-inch class.

Cols. 3 & 5. From cruise data

Col. 4. From Chart 1

Col. 6. = Col. 4 x Col. 5

Col. 7. From Illustration 1, 9333.32, Table 5. Falling and Bucking - Commercial Thinnings

Col. 8. = Col. 7 x Col. 5

Falling & Bucking on net basis =  $\frac{\text{Total Cost}}{\text{Net Merch.}}$  =  $\frac{\$ 2,747.60}{268 \text{ M}}$  = \$10.25/M for  
Falling & Bucking merchantable trees.

Average Log Volume =  $\frac{\text{Gross Merch.}}{\text{Total No. Logs}}$  =  $\frac{282 \text{ M}}{1042}$  = 271 b.f.





9333.3 - PRODUCTION COSTS  
(Schedule 19)

Following is an example using Chart 1 in lieu of the formula as described in method 1.

Example:

Given an average form class of 80 and an average total height of 120' above stump, the d.b.h. of the average tree is 16 inches.

$$\begin{aligned} \text{DBH} \times \text{F.C.} &= \text{DIB top 16' log} \\ 16" \times .80 &= 12.8" \text{ rounded to } 12" \end{aligned}$$

From Chart 1, 32Clc:

A tree with 12" d.i.b. top first 16' log, total height 120', has 6 logs to a 5" top d.i.b.

The following is an example using Chart 1 in lieu of tallying heights in 16' logs to a 5" top d.i.b. described in the second method.

Example:

Given a cruise of 1042 trees, an average form class of 82, a gross merchantable volume of 282 M bd. ft. and a net merchantable volume of 268 M bd. ft. Total heights of all 1042 trees are tallied during cruising. Cruise data tabulated and the falling and bucking costs are allocated as follows:

.9333.3 - PRODUCTION COSTS  
(Schedule 19)

.32C1c

Chart 1 - Alternative Method for Computing Number 11' Logs to 5" Top

COMMERCIAL THINNINGS

No. of 16 foot logs to a 5-inch top in terms of total height and top diameter 1st 16-foot log inside bark.

Total Height	6	8	Top Diameter 1st 16-foot log inside bark											
	10	12	14	16	18	20	22	24	26	28	30			
40	1	2	2	2	2	2	2	2	2					
50	2	2	2	3	3	3	3	3	3	3	3	3	3	
60	2	2	3	3	3	3	3	3	3	3	3	3	3	
70	2	3	3	3	4	4	4	4	4	4	4	4	4	
80	2	3	4	4	4	4	4	4	4	4	4	5	5	
90	2	3	4	4	5	5	5	5	5	5	5	5	5	
100	2	4	4	5	5	5	5	5	5	6	6	6	6	
110	3	4	5	5	5	6	6	6	6	6	6	6	6	
120	3	4	5	6	6	6	6	6	7	7	7	7	7	
130	3	5	6	6	6	7	7	7	7	7	7	7	7	
140	3	5	6	7	7	7	7	7	8	8	8	8	8	
150	3	5	6	7	7	8	8	8	8	8	8	8	8	
160				8	8	8	9	9	9	9	9	9	9	
170						9	9	9	9	9	9	9	10	
180						9	10	10	10	10	10	10	10	
190							10	10	10	10	11	11	11	
200							11	11	11	11	11	11	11	
210								11	12	12	12	12	12	
220									12	12	12	12	12	

Developed from U. S. Forest Service Research Note PN W-2, Board-foot Tree Volume Equations for Electronic Computers, May 1963 - by Floyd A. Johnson of the Pacific Northwest Forest and Range Experiment Station.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

2. Merchantable Tree Falling and Bucking Costs, (i.e., Commercial Thinnings (Western Oregon), Illustration 1, Table 5). The tabular cost for falling and bucking a one-log tree is the same as that for a two-log tree in the same d.b.h. class; the cost for falling and bucking a three-log tree is the same as that for a four-log tree, etc. The reason for this coincidence is that the costs are really based upon number of bucking cuts rather than on number of 16' logs, with a 32' log as standard. Thus, both one and two 16' logs represent one bucking cut; both three and four 16' logs represent two bucking cuts, etc.





9333.3 - PRODUCTION COSTS  
(Schedule 19)

3. Non-Merchantable Tree and Snag Felling. For costs of non-merchantable tree and snag felling, use Illustration 1, Table 3, "Non-Merchantable Tree and Snag Felling - Western Oregon."

.33 Rigging, Yarding and Loading.

A. Move-in. This includes the cost of moving logging equipment into the timber sale contract area. In this schedule, it is considered separately from rigging cost. This enables the appraiser to select from Illustration 2, Tables 1 and 2, move-in cost for any machine or combination of machines which he judges optimum for a particular situation. Thus, the appraiser may tailor his cost allowance to the local situation. The listed allowances cover all the costs of moving equipment to the job including the wages of attendant personnel. The following example is given as a guide to the use of these tables:

Move-in costs - usual high-lead side, western Oregon

<u>Item</u>	<u>Cost</u>
Medium Yarder	\$ <u>305.00</u>
Mobile Loader	\$ <u>635.00</u>
D8H or equivalent	<u>No allowance</u> 1/
Total high-lead move-in cost	\$ <u>940.00</u>

B. Rigging. These cost tables do not include the cost of moving equipment to the job, but are limited to costs involved in setting up yarding and loading equipment, the rigging of poles or spars, and landing construction. There are many situations which warrant other than normal rigging costs. Determination of the correct allowance is left to the discretion of the appraiser. Rigging cost tables are listed on Illustration 2, Tables 9, 13, 17, 23, 28, 31, 33, and 37.

1/ D8H is considered an excavation tractor, to be used in road construction. Its move-in cost is part of basic road construction move-in allowance. If logging will involve no road construction, add costs for appropriate type of tractor move-in.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

1. Mobile Yard-Loader rigging costs are limited to those involved in moving the machine from setup to setup, stabilizing it with guylines or outriggers, placement of tail and side blocks, rigging lines, and landing construction (if any). The mobile yard-loader usually operates from the shoulder of a road, building small decks of logs and moving frequently from setting to setting, so that landing construction is normally a minor cost.

C. Yarding.

1. Yarding cost is the cost of moving logs from the bucked tree on the ground to the landing for loading or swinging. All yarding costs are based on the gross volume of material yarded to a landing. This volume will obviously include some defect in most cases. While the tables list cost by the volume of a 16' log, the studies included the normal range of log lengths actually yarded and were converted for use with cruise data.

2. Yarding distance is the distance from choker setting point to landing over which the logs must actually travel. These distances refer to the distance for any turn or average of turns and not to the external distance for an area.

D. Loading. Loading cost is the cost involved in loading logs on a truck at a landing under normal conditions. The cost is based on a separate loader, i.e., both a yarder and loader, except for mobile yarder-loader which does both jobs. For loading production which is limited to the yarding production (hot deck loading) the volume loaded is assumed to be essentially the same as that yarded--that is, having the same volume of defect. If this is not the case, an adjustment must be made. Cold deck loading also includes whatever percentage of defect will be hauled to the plant and is presumably approximately the same as that yarded.

E. Tractor.

1. Western Oregon - Yarding. Illustration 2, Tables 3 and 4 are the result of time studies taken on six Bureau of Land Management timber sales. Times were taken on the yarding, choker setting, delays, and other related activities for some 511 turns on a wide range of conditions in Western Oregon. Other data taken in the field were percent slope, haul-in distance, straight-line distance, volume per log, volume per turn, number of logs per turn, and number of stems per acre. All of the foregoing items were analyzed to determine the significance of their effect on the time per MBF to tractor log. The machine rate used is current for a tractor having equivalent h.p. to those used on time study areas. It is extremely important to note that the distance referred to in this table is the distance the tractor actually moved in yarding the logs. A factor



9333.3 - PRODUCTION COSTS  
(Schedule 19)

must be applied to the average horizontal yarding distance as scaled from the map layout, to compensate for weave and slope. In the absence of data pertinent to a particular situation, it is suggested that this map distance be increased by 20 percent (factor 1.2). Tractor yarding and loading costs are combined in Table 3. It is not necessary to interpolate Tables 3 or 4.

2. Western Oregon - Loading. Illustration 2, Table 5, covers hot deck loading on a landing to which logs are yarded by tractor. The production varies directly with the production of the yarding operation to the point at which volume yarded exceeds loading capacity and cold decking becomes necessary. From that point on the cost remains uniformly equal to that of cold deck loading. It is not necessary to interpolate Tables 3 or 5.

3. Western Oregon - Partial Cut Operations. Illustration 2, Tables 6, 7 and 8 for partial cut tractor operations in western Oregon were developed from 28 time studies made on 16 operations in the Medford District. Yarding time and other pertinent data were recorded for 799 turns of logs over a wide variety of conditions in topography and marking practices.

Tables 7 and 8 provide adjustment factors for small "salvage pickup" type operations when the full equipment and crew complement for partial cut tractor yarding are not usually used. Those adjustments reflect a front end log loader, one yarding tractor and a correspondingly smaller crew.

4. Eastern Oregon - Yarding. Illustration 2, Tables 10 and 11 costs are based on time studies conducted under typical east side logging conditions, i.e., slopes varying but not generally severe, and rather normal, fairly open stands. The machine rate used is current for a tractor having equivalent h.p. with those used on time study areas. The distances are, as in the case of western Oregon tractor yarding, those which the tractor actually travels. Under the normal Bureau of Land Management average yarding distance determination procedures, an addition must be made to compensate for additional tractor traveling distance in order to use this table. An increase of 20 percent is suggested to compensate for weave and slope.

5. Eastern Oregon - Loading. Illustration 2, Table 12 - Loading for a tractor yarding operation is hot deck loading on a landing to which logs are being yarded by tractor. The production again varies directly with the production of the yarding operation to the limit of loading capacity. From that point on, the cost remains uniformly equal to that of cold deck loading.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

F. High Lead.

1. Western Oregon - Yarding. Illustration 2, Tables 14, 15 and 16, are based on two sets of time studies on twelve Bureau of Land Management timber sales. The first set involved times for some 1183 turns. The second set included times for 801 turns. Care was taken to insure that a wide variety of logging conditions was included. Other data recorded in the field were ground slope, line slope, yarding distance, number of logs per turn, gross volume per turn, volume per acre, and stems per acre. Each set of studies was then analyzed separately but in an identical manner. The time per MBF for each turn was determined. Then the field data, such as yarding distance, volume per log, stems per acre, etc., were tested to determine the significance of their effect upon the time per MBF. In both sets of studies, the same group of factors were statistically significant--volume per log, percent line slope, and yarding distance. Through a covariance analysis it was determined that the two sets of studies could not be lumped together and considered as one. As a result, a common equation was computed. The yarding time per MBF table was then constructed from the common equation. Supplemental delay times were added and the machine and wage rates applied. The tables are constructed so that no interpolation is necessary.

2. Western Oregon - Portable Tower Yarding. Illustration 2, Tables 18, 19, 20 and 21 were developed by applying portable tower machine rates plus applicable crew wage rates to the regular high-lead production study per MBF. Before using the portable tower costs, the appraiser should carefully consider the following points.

a. Is the portable tower a piece of equipment that the average operator in the area uses?

b. Is the sale which is being appraised suited to the economical use of a portable tower?

Because of the greater investment, yarding costs, under the same conditions, are higher for the portable tower system than for the conventional pole setup. The savings that accrue through the use of the portable tower are mainly due to the mobility of the machine and the resultant low rig-up costs which must normally be accompanied by relatively shorter yarding distances. It is not necessary to interpolate the tables.

3. Western Oregon - High Lead Loading. Costs recorded in Illustration 2, Table 16, for loading is hot deck loading on a high-lead landing. The production varies directly with that of the yarder to the point at which volume yarded exceeds loading capacity and cold decking becomes necessary. From this point the cost is uniformly equal to that of cold deck loading. It is not necessary to interpolate the table.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

G. Skyline. Skyline systems may offer substantial advantages over conventional logging systems by reducing excessive road construction costs and providing better site protection including minimizing soil losses.

Skyline logging usually requires different access road locations than logging with conventional equipment. Therefore, planning for skyline layouts must be coordinated with road development planning.

1. Western Oregon - Static Skyline Yarding. Illustration 2, Tables 24 and 25, pertains to operation of large skyline equipment with uphill or downhill yarding capability of 5,000 feet or more slope distance. The cost tables are based on a time study conducted on Bureau of Land Management clear cut timber sale layouts over a period of four months. Data recorded in the field included skyline slope yarding (in-haul) distance (measured along average ground slope), lateral skidding distance and lateral slope (both measured at right angles to skyline axis), number of logs per turn, gross volume per turn, and time for each phase of the yarding cycle (haulback, lateral outhaul, hooking, lateral skidding, in-haul and unhooking). These data were grouped in two categories: uphill yarding (248 turns) and downhill yarding (210 turns). Initial analysis indicated that total time per MBF yarded, rather than time for each phase of the cycle, was meaningful. Each type of yarding was then analyzed separately but in an identical manner. The field data were tested to determine the effect of each independent variable on time per MBF. In both uphill and downhill yarding, the most statistically significant variable, by far, was volume per log, as calculated from number of logs per turn and gross volume per turn. Yarding distance was significant at a much lower level.

A covariance analysis showed that the data for the two types of yarding could not be combined to serve as a single datum base. Therefore, a common equation was developed to fit both types of data. This equation includes a delay time factor. The table of yarding times per MBF was then constructed from this equation. Machine and wage rates were applied to the yarding times. The resulting cost tables need no interpolating.

2. Western Oregon - Skyline Loading. All skyline loading is hot deck loading on a skyline landing. As in high-lead loading, production varies directly with that of the yarder. No separate skyline loading cost table is included herein, i.e., a cost table for hot deck loading. If skyline hot deck loading costs must be separately identified, they can be calculated by deducting yarding costs from the corresponding combined yarding and loading costs. If cold deck loading cost is needed, use Illustration 2, Table 30.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

H. Commercial Thinnings.

1. Western Oregon - Yarding. Illustration 2, Tables 34 and 35, are based upon a series of field studies conducted by the Pacific Northwest Forest and Range Experiment Station on commercial thinning operations in western Oregon and western Washington. Study areas were characterized by moderately even-age stand conditions and slopes generally under 40 percent. Time study data included observations of 236 turns of logs for the light crawler tractor and 296 turns for the rubber-tired skidder. Data were recorded for a wide range of variables, all of which were analyzed for significance by step-wise multiple regression. Significant variables were retained in the formulae developed to compute yarding cycle time for each of the two tractors. It is not necessary to interpolate Tables 34 and 35. The appraiser is given a choice of two machines because silvicultural objectives and/or physical factors may favor the use of one or the other. When the average log is small, as it normally is in a thinning sale, the rubber-tired skidder is substantially more economical, on a cost per M basis, than is the light crawler tractor. However, difficult terrain and a considerable number of large logs may require the greater tractive power of the crawler. Preference of local loggers for one machine or the other may also influence the appraiser's choice.

2. Western Oregon - Loading. Illustration 2, Table 36, Loading Cost, as defined for commercial thinnings, is the cost of loading logs on a truck from a cold deck at a landing. The cost is based on the operation as performed by a logging contractor using a light rubber-tired loader. This loading operation includes whatever percentage of defect will be hauled to the plant, which is presumed to be approximately the same as that yarded.



9333.3 - PRODUCTION COSTS

(Schedule 19)

I. (Reserved)

J. (Reserved)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

K. Small Operations.

1. Type Operations. This section is intended to give cost guides where sales of small volumes of timber are contemplated. For example, right-of-way timber or salvage of a few high risk trees or merchantable snags.

2. Small Mobile Loader With Yarding Tractor. Illustration 2, Tables 4, 7 and 11 lists tractor yarding costs applicable for small operations. Illustration 2, Table 31 lists loading and rigging costs for a small sized mobile loader. This is cold deck loading and the loading operation should involve little or no delay time. Loading cost per MBF is relatively constant.

3. Light Yarder Loader Operations. Illustration 2, Tables 32 and 33 are appropriate for small operations when very light partial cut logging is being considered and silvicultural or physical conditions favor cable logging over tractor logging. These cost tables should not be used for the "typical" yarder loader harvest or normal salvage type operations.

L. Other Allowances.

1. Swinging.

a. Hot Deck Swinging - Western Oregon. Illustration 2, Tables 26 and 27 costs reflect hot deck swinging conducted simultaneously with yarding, i.e., the logs yarded to the "hot deck" are "swung" to the roadside landing as fast as they are yarded. The swinging production rate is thus limited by the capacity of the yarder. Since the producing capacity of the yarder is the limiting factor, high-lead hot deck swinging costs are based upon yarder production as indicated by BLM time studies. Cost of operating a swing tree has been applied to the time dictated by the conditions which determine yarding production.

b. Cold Deck Swinging - Western Oregon. Illustration 2, Table 29 reflects cold deck swinging which takes place after all the logs have been yarded and decked. It involves the movement of logs from "cold storage" to a roadside landing. Factors which limit cold deck swinging production include yarder line speed, log size, and distance from deck to landing.

Costs are based on time studies made on North Bend Skyline operations. Adjustments have been made for current costs. Since yarding production has no influence, yarding distance is excluded as a cost factor. Log size and distance from deck to roadside landing are the variables used to determine cost.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

2. Cold Deck Loading - Western and Eastern Oregon. Illustration 2, Table 30 refers to the loading of trucks from a landing on which the loading production is not limited to the production of the yarding operation, as it is under hot deck loading conditions. Cost applies to both eastern and western Oregon operations. It is based on the operating cost of a mobile loader operation, loading 165 M bd.ft. per eight hours.

3. Gross Yarding (cull material). It is sometimes necessary to require that the timber purchaser remove cull material from a stream channel to allow passage of anadromous fish or to improve drainage. "Gross" yarding may also be desirable as preparation of the cutting area for establishment of the next crop of trees.

Appraisal allowances for such contractual requirements may be computed by treating the cull material to be yarded as additional gross merchantable volume with no net recovery.

A reasonably accurate estimate of the gross cull volume is essential. The total cost of yarding this volume by the means anticipated (tractor, high-lead, etc.) should be estimated in the same manner as for gross merchantable volume. This cost figure is carried into the yarding cost summary and becomes part of the total move-in, rigging, yarding and loading cost. Thus, the additional expense of "gross" yarding is reflected in the unit cost per MBF net volume.

M. Factor Determination.

1. Yarding Distances. To find the yarding distance for each area, the yarding distance factors found in the following tables are multiplied by the length of the side which is the denominator in the ratio. These factors apply to actual distances and areas. When used with a map layout, the result is not correct with respect to the actual yarding distance.

a. Tractor Logging. In order to allow for the weave and slope in tractor yarding, a factor must be applied to the average horizontal yarding distance as found on the map layout. In the absence of data pertinent to a particular situation, it is suggested that this distance be increased by 20 percent.

b. High-lead Logging. The slope factor in high-lead logging must be considered to determine actual distance. This can be done directly by drawing the setting layout to scale using actual slope distances to determine ratios and, thus, the yarding distance. However, sufficient accuracy can be obtained by calculating the average slope (tail block to base of lead pole) and applying a slope factor to the average horizontal yarding

9333.3 - PRODUCTION COSTS  
(Schedule 19)

distance as determined through use of a map layout. Slope factors are found on Chart 5.

c. Skyline Logging. As in yarding distance determination for high-lead logging, slope must be considered. However, ground slope and skyline slope are not synonymous. The latter is the slope of a chord from top of tower or spar tree at the landing to tail-hold anchor or top of tail spar, either of which may be located well outside the cutting area.

BLM time study data are based upon yarding distances measured along the average slope of skyline profile (ground slope) rather than skyline slope. Therefore, for skyline yarding, average ground slope should be measured or calculated from proposed spar location at landing to outer boundary of cutting area. With this exception, skyline yarding distance can be determined by the same procedures as high-lead yarding distance. See Chart 5 for slope factors.

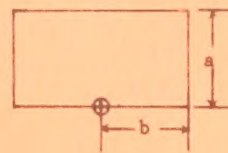
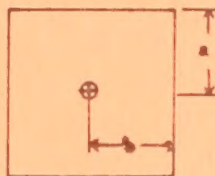
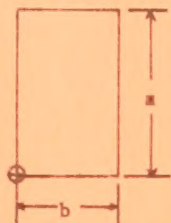
d. Mobile Yard Loader Logging. The slope factor must also be considered to determine actual distance. Sufficient accuracy can be obtained by calculating the average slope from a point directly below the fairlead (on the boom) to the tail block and applying a slope factor to the average horizontal yarding distance as determined from a map layout. Slope factors are listed on Chart 5.



## 9333.3 - PRODUCTION COSTS

(Schedule 19)

Chart 1 - Yarding Distance Determination

YARDING DISTANCE FACTOR BY RATIO OF SIDES

## LOGGING DIAGRAMS

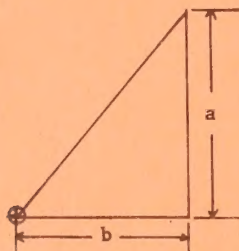
Ratio "a" "b"	"b" Factor	Ratio "a" "b"	"b" Factor	Ratio "a" "b"	"b" Factor
.1	.50	2.9	1.57	5.7	2.91
.2	.51	3.0	1.61	5.8	2.96
.3	.53	3.1	1.66	5.9	3.01
.4	.55	3.2	1.71	6.0	3.06
.5	.58	3.3	1.76	6.1	3.11
.6	.61	3.4	1.80	6.2	3.16
.7	.64	3.5	1.85	6.3	3.21
.8	.67	3.6	1.90	6.4	3.26
.9	.71	3.7	1.95	6.5	3.31
1.0	.75	3.8	1.99	6.6	3.36
1.1	.78	3.9	2.04	6.7	3.40
1.2	.82	4.0	2.09	6.8	3.45
1.3	.86	4.1	2.14	6.9	3.50
1.4	.90	4.2	2.19	7.0	3.55
1.5	.94	4.3	2.23	7.1	3.60
1.6	.99	4.4	2.28	7.2	3.65
1.7	1.03	4.5	2.33	7.3	3.70
1.8	1.07	4.6	2.38	7.4	3.75
1.9	1.11	4.7	2.43	7.5	3.80
2.0	1.16	4.8	2.48	7.6	3.85
2.1	1.20	4.9	2.52	7.7	3.90
2.2	1.25	5.0	2.57	7.8	3.95
2.3	1.29	5.1	2.62	7.9	4.00
2.4	1.34	5.2	2.67	8.0	4.05
2.5	1.38	5.3	2.72	8.5	4.29
2.6	1.43	5.4	2.77	9.0	4.54
2.7	1.48	5.5	2.82	9.5	4.79
2.8	1.52	5.6	2.87	10.0	5.04

Divide "a" distance by "b" distance to determine ratio  $\frac{a}{b}$ . Multiply "b" distance by "b" factor to determine yarding distance. You may select either of the two distances for "a" distance. However, it is recommended that "b" distance be the shorter of the two.

## 9333.3 - PRODUCTION COSTS

(Schedule 19)

Chart 2 - Yarding Distance Determination

YARDING DISTANCE FACTOR BY RATIO OF SIDES

LOGGING DIAGRAMS

Ratio "a" "b"	"b" Factor	Ratio "a" "b"	"b" Factor	Ratio "a" "b"	"b" Factor
.1	.67	2.9	1.17	5.7	2.01
.2	.67	3.0	1.20	5.8	2.05
.3	.67	3.1	1.23	5.9	2.08
.4	.68	3.2	1.26	6.0	2.11
.5	.69	3.3	1.29	6.1	2.14
.6	.70	3.4	1.31	6.2	2.17
.7	.71	3.5	1.34	6.3	2.20
.8	.72	3.6	1.37	6.4	2.24
.9	.73	3.7	1.40	6.5	2.27
1.0	.75	3.8	1.43	6.6	2.30
1.1	.76	3.9	1.46	6.7	2.33
1.2	.78	4.0	1.49	6.8	2.36
1.3	.80	4.1	1.52	6.9	2.39
1.4	.81	4.2	1.55	7.0	2.43
1.5	.83	4.3	1.58	7.1	2.46
1.6	.85	4.4	1.61	7.2	2.49
1.7	.87	4.5	1.64	7.3	2.52
1.8	.90	4.6	1.67	7.4	2.56
1.9	.92	4.7	1.70	7.5	2.59
2.0	.94	4.8	1.73	7.6	2.62
2.1	.97	4.9	1.76	7.7	2.65
2.2	.99	5.0	1.80	7.8	2.68
2.3	1.02	5.1	1.83	7.9	2.72
2.4	1.04	5.2	1.86	8.0	2.75
2.5	1.07	5.3	1.89	8.5	2.91
2.6	1.09	5.4	1.92	9.0	3.07
2.7	1.12	5.5	1.95	9.5	3.24
2.8	1.15	5.6	1.98	10.0	3.40

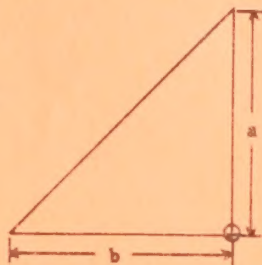
Divide "a" distance by "b" distance to determine ratio  $\frac{a}{b}$ . Multiply "b" distance by "b" factor to determine yarding distance.



## 9333.3 - PRODUCTION COSTS

(Schedule 19)

Chart 3 - Yarding Distance Determination

YARDING DISTANCE FACTOR BY RATIO OF SIDES

## LOGGING DIAGRAMS

Ratio $\frac{"a"}{"b"}$	"b" Factor	Ratio $\frac{"a"}{"b"}$	"b" Factor	Ratio $\frac{"a"}{"b"}$	"b" Factor
.1	.33	2.9	1.02	5.7	1.93
.2	.34	3.0	1.05	5.8	1.96
.3	.35	3.1	1.09	5.9	1.99
.4	.36	3.2	1.12	6.0	2.03
.5	.37	3.3	1.15	6.1	2.06
.6	.39	3.4	1.18	6.2	2.09
.7	.41	3.5	1.21	6.3	2.13
.8	.43	3.6	1.25	6.4	2.16
.9	.45	3.7	1.28	6.5	2.19
1.0	.47	3.8	1.31	6.6	2.22
1.1	.50	3.9	1.34	6.7	2.26
1.2	.52	4.0	1.37	6.8	2.29
1.3	.55	4.1	1.41	6.9	2.32
1.4	.57	4.2	1.44	7.0	2.36
1.5	.60	4.3	1.47	7.1	2.39
1.6	.63	4.4	1.50	7.2	2.42
1.7	.66	4.5	1.54	7.3	2.46
1.8	.69	4.6	1.57	7.4	2.49
1.9	.72	4.7	1.60	7.5	2.52
2.0	.74	4.8	1.63	7.6	2.55
2.1	.77	4.9	1.67	7.7	2.59
2.2	.81	5.0	1.70	7.8	2.62
2.3	.84	5.1	1.73	7.9	2.65
2.4	.87	5.2	1.76	8.0	2.69
2.5	.90	5.3	1.80	8.5	2.85
2.6	.93	5.4	1.83	9.0	3.02
2.7	.96	5.5	1.86	9.5	3.18
2.8	.99	5.6	1.90	10.0	3.35

Divide "a" distance by "b" distance to determine ratio  $\frac{a}{b}$ . Multiply "b" distance by "b" factor to determine yarding distance. You may select either of the two distances for "a" distance. However, it is recommended that "b" distance be the shorter of the two.

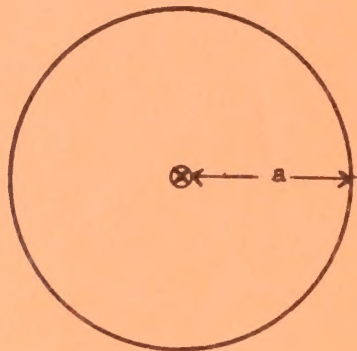
.33Mb1)

9333.3 - PRODUCTION COSTS

(Schedule 19)

Chart 4 - Yarding Distance Determination

YARDING DISTANCE FACTOR FOR A CIRCLE OR CIRCLE SECTOR



Yarding Distance = .67

Where landings are in the center of a circle or the apex of a circle sector , the radius of the circle or the distance from apex to perimeter of the sector is multiplied by a factor of .67 to determine the average yarding distance.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

(.33Mlb)

Chart 5 - Yarding Distance Determination

HIGH-LEAD LOGGING -  
SLOPE DISTANCE FACTORS 1/

<u>Per cent of Slope</u>	<u>Factor</u>
5	1.00
10	1.00
15	1.01
20	1.02
25	1.03
30	1.04
35	1.06
40	1.08
45	1.10
50	1.12
55	1.14
60	1.17
65	1.19
70	1.22
75	1.25
80	1.28
85	1.31
90	1.35
95	1.38
100	1.41

1/ Ratio of slope distance to horizontal distance.

9333.3 - PRODUCTION COSTS  
(Schedule 19)

.34 Transportation. These costs include all expenses incurred in moving logs from woods landing to utilization center. Generally, these are trucking expenses; however, water transportation costs may be involved.

A. Standard Method. This involves timing of actual round trip truck hauling operations on specific road segments. Since this method is based upon empirical measurements of time, all physical effects of road geometrics (grade, alignment, width) and surface will be reflected in the recorded time.

All costs involved in moving merchantable material from loading point to utilization center will be evaluated. These costs will incorporate ownership and operating expenses for the average logging truck and round trip time and normal delay time for the truck.

1. Cost Factors.

a. Operating Time. Those periods when the truck is actually transporting logs to the destination or returning empty to the loading point. Operating time includes legally required stops at intersections and unavoidable delays in traffic, and other variable, unpredictable delays such as tightening binder chains, minor repairs made by driver, smoke breaks, conversation, etc.

b. Normal Delay Time. Those periods when the truck is on the job, but not in operating status. It includes relatively constant, predictable periods in two general categories:

(1) Observed Delays. Those caused by loading, unloading, scaling, weighing, etc. These delays are seen and recorded during collection of truck hauling data, and are part of total mean time per round trip.

(2) Fixed Delay. An allowance of 30 minutes per day is included to compensate for time spent in engine warmup and routine servicing and fueling of the truck. This allowance is based upon data collected from industry.

Normal delay time does not include any breakdown which requires shop repair, or the services of a skilled mechanic. The same is true of a spilled load of logs. Such an observation should be ended at the location where the breakdown or load loss occurs.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

c. Round Trip Minute (RTM). The basic unit in measurement of round trip time from loading point to destination which includes observed delay time as defined in b(1) above.

d. Destination. Point to which truck load of logs is delivered. It may be a utilization center, or it may be a log dump on a waterway or a reloading point on a railroad, intermediate between woods and utilization center.

e. Gross Load Volume. This is the gross volume of the average truck load of logs as estimated for a given area. It will vary with locality and type of material hauled (run-of-the-woods logs, logs from commercial thinnings, "cull" logs). Each BLM district should review its truck scale records periodically. These records should be used as a basis for predicting the average gross load volume for a given proposed sale.

Current data indicate that the average gross load volume for BLM sales in western Oregon is 7.190 M bd. ft. (short log scale).

f. Road Categories. Data will be kept in four broad classifications:

<u>Log Haul Road Class</u>	<u>Definition</u>	<u>Usable Width</u>
I	Highway	24 ft. and over
II	Two lane road	20 - 23+ ft.
III	Single lane road	12 - 19+ ft.
IV	Logging spur road	10 - 11+ ft.

2. Clocking Procedure. Road clocking can be accomplished by various means. A two-man crew can do the job, one man driving and reading the odometer while the other observes and serves as timekeeper and recorder.

Another method involves the use of a "cassette" type tape recorder with microphone equipped with on-off switch hung around the driver's neck for oral note taking. A stop watch is taped to the dashboard near the odometer for recordation of time and mileage. This technique reduces road clocking to a one-man operation, the driver functioning simultaneously as observer and recorder. Notes are later transcribed from tape to road clocking forms. Field testing indicates that this procedure is practical and efficient.

Road clocking may also be done by crews equipped with two-way radios. Since clocking can thus be done without actually following the truck under observation, driving is kept to a minimum. One radio-equipped crew member is stationed at the loading point, the others at critical check points



9333.3 - PRODUCTION COSTS  
(Schedule 19)

(road junctions) along the route. The truck being timed is identified from station to station by physical description, make and license number.

3. Number of Observations Required. This will depend upon the variation of the individual observations. A minimum of five sample runs, from loading point to destination (loaded) and from destination to loading point (empty) is required. If the total elapsed operating time of one of these observations should vary by more than thirty percent from the mean total operating time of all observations, it will be necessary to make five additional observations. In this case, all ten observations should be used in recomputing mean total operating time.

B. Alternative Method. This employs time data collected by past procedures, i.e., using distance, percent of rise and rate of rise and fall as independent variables. However, the alternative method derives costs from time data by essentially the same mechanics as used in the standard method.

The time tables following this section are based on hauling under virtually all of the conditions found in Oregon. The times have been related only to the variables distance, percent of rise and rate of rise and fall. In the selection of areas in which to make studies, the factor of road alignment, as it limits rate of travel, was considered. Therefore, while it is not possible to isolate as an individual variable, some reduction in speed due to road alignment has been introduced through the sample.

1. Cost Factors.

a. Percent of Rise. The percent of rise is that portion of undulating road over which the truck has to move its load uphill; it is found by dividing the total rise by the total rise and fall. If the total change in elevation for a given road is 1,200 feet of which 300 feet is uphill travel, the "percent of rise" would be 25%. Since Charts 1, 2, and 3 are graduated in increments of ten percent, 25% would fall in the 20% to 30% class.

b. Rate of Rise and Fall. Rate of rise and fall is the total change in elevation of any road compared to its total length. If a road 10 miles (52,820 feet) in length had a total rise and fall of 5,000 feet, the rate of rise and fall would be -

$$\frac{5,000 \text{ feet}}{52,820 \text{ feet}} \text{ or}$$

9.46%, rounded to 9.5%.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

c. Surface

(1) Hardtop.

- (a) Concrete, any lane width
- (b) Black top, any lane width
- (c) Gravel, when two-lane width, road surface 1-inch minus material, well graded and compacted; good visibility
- (d) Dirt, when two-lane width, road surface well graded and compacted; good visibility

(2) Gravel. All gravel roads other than (c) above.

(3) Dirt. All dirt roads other than (d) above.

d. Log Scale Recovery. Log scale recovery in this section is the appraiser's estimate of the percent of the material hauled from the woods which will be recovered in products.

e. Operating Time. Those periods when the truck is available for transporting logs. Operating time (under the alternative method) includes a constant allowance of 40 minutes per round trip, which is added to the total clocked time to cover loading and unloading, scaling, weighing, unavoidable delays in traffic, legally required stops at inter-sections, and other variable, unpredictable delays such as tightening binder chains, minor repairs made by driver, smoke breaks, conversation, etc.

f. Fixed Delay Time. An allowance of 30 minutes per day is included to compensate for time spent in engine warmup and routine servicing and fueling of the truck. This allowance is based upon data collected from industry.

g. Truck (On Highway). Diesel or gasoline truck and trailer combination with maximum 8-foot bunks and legal restriction on gross weight. See footnote 1, Chart 5.

h. Truck (Off Highway). Diesel or gasoline truck and trailer combination not restricted to "on highway" bunk width and gross weight limitations. See footnote 2, Chart 5.

2. Clocking Procedure. To use the following five charts, measurements of rise, fall, and mileage must be made on the road to be used.

9333.3 - PRODUCTION COSTS  
(Schedule 19)

a. Rise and Fall. The easiest method of measuring the rise and fall in a road is with a sensitive type altimeter (Wallace and Tiernan or equivalent) which can be read to the nearest two feet. When using a base instrument, two runs should be made over the road at any time of the day. When the base is not used, the two runs must be made between six and ten in the morning or from three to six in the afternoon. This is due to barometric and temperature change. It cannot be too greatly stressed that all rises and all falls must be measured. The instrument must be level and allowed to come to rest before moving to the next reading. When allowing for transportation on roads not yet constructed, the appraiser shall estimate the changes in elevation to the best of his ability.

b. Mileage. Mileage can be read from the odometer to the nearest tenth of a mile. All important road junctions should be noted and the mileage thereto recorded.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Chart 1 - Alternative Transportation Method

ROUND TRIP TIME - HARD SURFACE

Minutes per Mile

Rate of Rise & Fall	Per cent of Rise <sup>1/</sup>									
	0-10 Min.	10-20 Min.	20-30 Min.	30-40 Min.	40-50 Min.	50-60 Min.	60-70 Min.	70-80 Min.	80-90 Min.	90-100 Min.
0.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
0.5	3.0	3.0	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.2
1.0	3.1	3.1	3.2	3.2	3.2	3.2	3.3	3.3	3.3	3.4
1.5	3.2	3.2	3.3	3.3	3.4	3.5	3.5	3.6	3.6	3.7
2.0	3.3	3.4	3.5	3.5	3.6	3.7	3.8	3.9	4.0	4.1
2.5	3.4	3.5	3.7	3.8	3.9	4.0	4.2	4.3	4.4	4.6
3.0	3.6	3.7	3.9	4.1	4.3	4.5	4.6	4.8	4.9	5.1
3.5	3.8	4.0	4.2	4.4	4.6	4.9	5.1	5.3	5.5	5.8
4.0	4.0	4.2	4.5	4.8	5.1	5.4	5.7	5.9	6.2	6.5
4.5	4.2	4.5	4.9	5.2	5.5	5.9	6.2	6.6	6.9	7.3
5.0	4.4	4.8	5.3	5.7	6.1	6.6	7.0	7.4	7.8	8.3
5.5	4.7	5.2	5.7	6.2	6.8	7.2	7.7	8.2	8.8	9.3
6.0	5.0	5.5	6.1	6.7	7.3	8.0	8.5	9.1	9.8	10.3
6.5	5.3	5.9	6.6	7.3	8.0	8.8	9.5	10.1	10.8	11.6
7.0	5.6	6.4	7.2	8.0	8.8	9.4	10.4	11.2	12.0	12.8
7.5	5.9	6.8	7.7	8.7	9.6	10.5	11.4	12.3	13.2	14.1
8.0	6.3	7.3	8.4	9.4	10.4	11.5	12.5	13.5	14.6	15.6
8.5	6.7	7.8	9.0	10.1	11.3	12.5	13.6	14.7	15.9	16.1
9.0	7.1	8.4	9.7	11.0	12.3	13.6	14.9	16.2	17.5	18.8
9.5	7.6	9.0	10.4	11.9	13.3	14.7	16.1	17.6	19.0	20.5
10.0	8.0	9.6	11.2	12.8	14.3	15.9	17.5	19.1	20.7	22.2

<sup>1/</sup> Per cent of rise figured in direction of loaded truck. Round-trip time is that time required for a loaded truck to travel one mile and return.

9333.3 - PRODUCTION COSTS  
(Schedule 19)

Chart 2 - Alternative Transportation Method

ROUND TRIP TIME - GRAVEL SURFACE

Minutes per Mile

Rate of Rise & Fall	Per cent of Rise <sup>1/</sup>									
	0-10 Min.	10-20 Min.	20-30 Min.	30-40 Min.	40-50 Min.	50-60 Min.	60-70 Min.	70-80 Min.	80-90 Min.	90-100 Min.
0.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
0.5	5.0	5.0	5.0	5.1	5.1	5.1	5.2	5.2	5.2	5.2
1.0	5.0	5.0	5.1	5.2	5.2	5.3	5.3	5.4	5.4	5.5
1.5	5.1	5.2	5.3	5.4	5.5	5.5	5.6	5.7	5.8	5.9
2.0	5.3	5.4	5.5	5.6	5.7	5.9	6.0	6.1	6.2	6.3
2.5	5.5	5.7	5.8	6.0	6.2	6.3	6.5	6.7	6.9	7.0
3.0	5.8	6.0	6.2	6.4	6.6	6.8	7.0	7.2	7.5	7.7
3.5	6.1	6.4	6.7	6.9	7.2	7.5	7.7	8.0	8.3	8.5
4.0	6.5	6.8	7.1	7.5	7.8	8.1	8.5	8.8	9.1	9.4
4.5	7.0	7.4	7.8	8.2	8.6	9.0	9.4	9.8	10.2	10.6
5.0	7.5	8.0	8.4	8.9	9.4	9.8	10.3	10.7	11.2	11.7
5.5	8.1	8.7	9.2	9.8	10.3	10.8	11.4	11.9	12.4	13.0
6.0	8.8	9.4	10.0	10.6	11.2	11.8	12.4	13.0	13.7	14.2
6.5	9.5	10.1	10.8	11.5	12.2	12.9	13.5	14.2	14.9	15.5
7.0	10.1	10.8	11.6	12.3	13.1	13.9	14.6	15.3	16.1	16.8
7.5	10.8	11.6	12.4	13.2	14.1	14.9	15.7	16.8	17.3	18.1
8.0	11.4	12.3	13.2	14.1	15.0	15.9	16.7	17.7	18.8	19.5
8.5	12.1	13.0	14.0	15.0	15.9	16.9	17.9	18.8	19.8	20.8
9.0	12.7	13.7	14.8	15.8	16.8	17.9	18.9	20.0	21.0	22.0
9.5	13.4	14.5	15.6	16.7	17.8	18.9	20.0	21.1	22.3	23.4
10.0	14.0	15.2	16.4	17.5	18.7	19.9	21.1	22.3	23.5	24.7

<sup>1/</sup> Per cent of rise figured in direction of loaded truck. Round-trip time is that time required for a loaded truck to travel one mile and return.



## 9333.3 - PRODUCTION COSTS

(Schedule 19)

Chart 3 - Alternative Transportation Method

ROUND TRIP TIME - DIRT SURFACE

Minutes per Mile

Rate of Rise & Fall	Per cent of Rise <sup>1/</sup>									
	0-10 Min.	10-20 Min.	20-30 Min.	30-40 Min.	40-50 Min.	50-60 Min.	60-70 Min.	70-80 Min.	80-90 Min.	90-100 Min.
0.0	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9
0.5	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9
1.0	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9
1.5	7.9	7.9	8.0	8.0	8.0	8.1	8.1	8.1	8.2	8.2
2.0	7.9	8.0	8.0	8.1	8.2	8.2	8.3	8.4	8.4	8.5
2.5	7.9	8.0	8.2	8.3	8.4	8.5	8.7	8.8	8.9	9.0
3.0	7.9	8.1	8.3	8.5	8.7	8.8	9.0	9.2	9.4	9.6
3.5	8.1	8.4	8.6	8.9	9.1	9.4	9.6	9.9	10.1	10.4
4.0	8.3	8.6	8.9	9.3	9.6	9.9	10.2	10.6	10.9	11.2
4.5	8.7	9.1	9.5	9.9	10.3	10.7	11.1	11.5	11.9	12.3
5.0	9.1	9.6	10.1	10.5	11.0	11.5	12.0	12.4	12.9	13.4
5.5	9.7	10.2	10.8	11.3	11.8	12.4	12.9	13.4	14.0	14.5
6.0	10.3	10.9	11.5	12.0	12.6	13.2	13.8	14.4	15.0	15.6
6.5	11.1	11.7	12.3	12.9	13.6	14.2	14.8	15.4	16.0	16.7
7.0	11.8	12.5	13.1	13.8	14.5	15.1	15.8	16.5	17.1	17.8
7.5	12.8	13.5	14.2	14.8	15.5	16.2	16.9	17.5	18.2	18.9
8.0	13.7	14.4	15.1	15.8	16.5	17.2	17.9	18.6	19.3	20.0
8.5	14.7	15.4	16.1	16.9	17.5	18.2	19.0	19.7	20.4	21.1
9.0	15.6	16.3	17.1	17.8	18.5	19.3	20.0	20.7	21.5	22.2
9.5	16.6	17.3	18.1	18.8	19.6	20.3	21.1	21.8	22.6	23.3
10.0	17.5	18.3	19.0	19.8	20.6	21.3	22.1	22.9	23.6	24.4
10.5	18.5									
11.0	19.4									
11.5	20.3									
12.0	21.3									
12.5	22.3									
13.0	23.3									
13.5	24.2									
14.0	25.0									
14.5	26.1									
15.0	27.0									

<sup>1/</sup> Per cent of rise figured in direction of loaded truck. Round-trip time is that time required for a loaded truck to travel one mile and return.

## 9333.3 - PRODUCTION COSTS

(Schedule 19)

Chart 4 - Alternative Transportation MethodWEIGHT RANGES BY SPECIES

(Pounds per Board Foot)

Douglas-fir	5.5 - 13.5 lb.	<u>1/</u>	Port-Orford-cedar	6.0 - 10.3 lb.
Ponderosa pine	6.5 - 11.5 lb.		Hemlock	8.4 - 11.8 lb.
Sugar pine	7.0 - 11.5 lb.		White fir	8.6 - 10.0 lb.
Spruce	5.0 - 7.5 lb.		Larch	6.5 - 10.0 lb.

1/ Use 11.0 lbs. as standard for commercial thinnings.

However, this log weight may be varied if well-documented experience indicates that other log weight averages are locally more applicable. Other log weight averages, if used, should be based upon accurate truck scale records and actual load weights from weighing stations. Load weights exceeding legal limits should not be used as basic data.

Variation from the standard 11.0 lbs. per board foot will affect both log hauling and loading costs. Fixed loading time for variable average weights will have to be computed and total loading time and cost adjusted accordingly.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Chart 5 - Alternative Transportation Method

NET VOLUME IN MBF PER LOAD 1/ 2/

Log Wt. per Bd. Ft.	Log Scale Recovery in Per cent						
	100	95	90	85	80	75	70
7.0	7.142	6.785	6.428	6.071	5.714	5.356	4.999
7.5	6.666	6.333	5.999	5.666	5.333	4.999	4.666
8.0	6.250	5.937	5.625	5.312	5.000	4.687	4.375
8.5	5.882	5.588	5.294	5.000	4.705	4.411	4.117
9.0	5.555	5.277	4.999	4.722	4.444	4.166	3.888
9.5	5.263	5.000	4.737	4.474	4.210	3.947	3.684
10.0	5.000	4.750	4.500	4.250	4.000	3.750	3.500
10.5	4.762	4.524	4.286	4.048	3.810	3.571	3.333
11.0	4.545	4.318	4.090	3.863	3.636	3.409	3.181

1/ Estimated average gross weight - loaded log truck and trailer -

Net weight of log truck and trailer -

72,000 lbs.

22,000 lbs.

Load Weight - 50,000 lbs.

2/ This table is intended only as an Alternative Method guide for estimating cost of transportation by "on highway" trucks. Experience may indicate that these load volumes are commonly exceeded by local practice. For example, timber sale access may be by roads on which "off highway" loadings are permitted. The appraiser should use the average net load volume which best fits the given situation.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

.35 Road Construction and Maintenance.

A. Engineering. Illustration 4, Table 1, is the expenses of engineering designed roads which may be constructed under terms of a timber sale contract. Engineering costs are not allowed for non-designed roads which require only a centerline location and grade established by BLM. The allowance for the total job--survey, design and slope staking--is the estimated cost of accomplishing this work on a centerline location previously designated by BLM. Table 1 covers engineering costs for both western and eastern Oregon.

B. Move-in. Illustration 4, Table 2, covers the cost of moving the minimum essential road building equipment from one job to another. A moving distance of 70 miles is considered average for the heavy transport, flag car and crews for move-in. This covers distance from town to previous job area, on to new job area, and return to town. Many loggers presently use two tractors in road construction, one equipped with dozer blade and ripper (without towing winch) and one with dozer blade and towing winch. The latter machine is herein considered a logging tractor; its moving cost is excluded from the road construction move-in cost allowance. See Illustration 4, Table 2 for components of the basic move equipment. If it is anticipated that additional equipment (wheel scraper, shovel, roller, dump truck, loader) will be used, the basic road construction move-in allowance must be increased accordingly.

C. Clearing and Grubbing. Grubbing is the removal of stumps from the ground by any one of several methods or combination of methods. It does not include the pushing of stumps and fragments from the right-of-way. Clearing is the removal of loosened or fragmented stumps, brush, debris and logs (other than yarding) from the limits of construction. Decking of right-of-way logs (where necessary) is considered part of the clearing operation. Yarding of right-of-way logs is essentially a logging operation rather than a part of road construction.

1. Acreage Determination. Grubbing and clearing acreages were computed from the average cross sections used for determining common excavation yardages on roads actually constructed. The tabular figures are slope or surface acres. These are intended for use when it is impractical to determine surface area from cross sections or by other means.

a. Grubbing Acreages. These acreages include the area from top of cut to toe of fill by percent of side slope. These acreages are for use when there is no separate tally of trees within the road prism. The appraiser must then compute a grubbing cost by using the average d.b.h. and number of stems per acre indicated by the cruise data.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

b. Clearing Acreages. These acreages represent the area which must be cleared for each 100' station by percent side slope. This area is based upon the distance from a point 10 feet (on slope) above the top of the cut to a point 5 feet (on slope) below the toe of the fill.

c. Turnout Acreages. Turnout acreages represent additional slope areas, beyond the scope of clearing for subgrades of standard width, which must be grubbed and cleared for turnout excavation. The table lists these acreages in two forms: acres per turnout and acres per station of turnout. The latter data are for use when turnout lengths vary. The number of stations of turnout may be determined by field measurement and formula:

Number of Stations of Turnout =

$$\frac{\text{Length of Turnout in Feet} + \text{Length of One Approach in Feet}}{100}$$

Refer to Chart 1 for acreages by station of road and turnouts.

2. Grubbing. Illustration 4, Table 3 costs are based upon averages for several different methods of removal, including loading and shooting with explosives, splitting with tractor attachment, and undercutting. Studies indicate that stumps of trees under 24 inches d.b.h. are usually pushed out by tractor mounted dozer, without grubbing.

3. Clearing. Illustration 4, Table 3 costs are based upon surface acres actually cleared. There is no apparent relationship between percent side slope and clearing cost per acre.

9333.3 - PRODUCTION COSTS  
(Schedule 19)

Chart 1 - Road Construction Clearing and Grubbing

GRUBBING AND CLEARING ACREAGES

% Side Slope	Acres per Station				Additional Acres - Turnouts			
	14' Subgrade 10' Usable Width		20' Subgrade 12' Usable Width		14' Subgrade 10' Usable Width 1/		20' Subgrade 12' Usable Width 2/	
	Grubbing	Clearing	Grubbing	Clearing	Acres/ Turnout	Ac/Sta.of Turnout	Acres/ Turnout	Ac/Sta.of Turnout
0	.051	.085	.078	.113	.016	.021	.046	.023
10	.051	.085	.078	.113	.016	.021	.046	.023
20	.057	.092	.078	.113	.017	.023	.056	.028
30	.060	.094	.083	.117	.026	.034	.070	.035
40	.067	.101	.090	.124	.040	.053	.110	.055
50	.076	.110	.092	.126	.050	.067	.152	.076
60	.073	.096	.122	.156	.074	.099	.120	.060
70	.078	.101	.101	.124	.033	.044	.088	.044
80	.087	.110	.115	.138	.036	.048	.102	.051
90	.099	.121	.131	.154	.057	.076	.114	.057
100	.115	.138	.154	.177	.062	.083	.128	.064

1/ Standard lengths: 50 foot turnout plus two 25 foot approaches.

2/ Standard lengths: 100 foot turnout plus two 50 foot approaches.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

D. Excavation. Excavation is the removal and relocation of various types of earth and rock encountered in building roads. It includes tractor and other machine work, manual labor and, when appropriate, the drilling and blasting of rock. Yardage figures in Illustration 4, Tables 4 through 8, are based upon actual field measurements. The tables are intended for use only when computed earthwork volumes are not available for a proposed road. Tables for common excavation are based upon cut slopes of 3/4:1 for side slopes up to 50 percent and 1/2:1 for side slopes over 50 percent. Tables for rock excavation are based upon a 1/4:1 cut slope. Both road classes (14 foot subgrade - 10 foot usable width, and 20 foot subgrade - 12 foot usable width) employ a ditch 3 feet wide as measured horizontally from ditch bottom to inside edge of roadbed. Common is that material which can be moved without blasting or ripping.

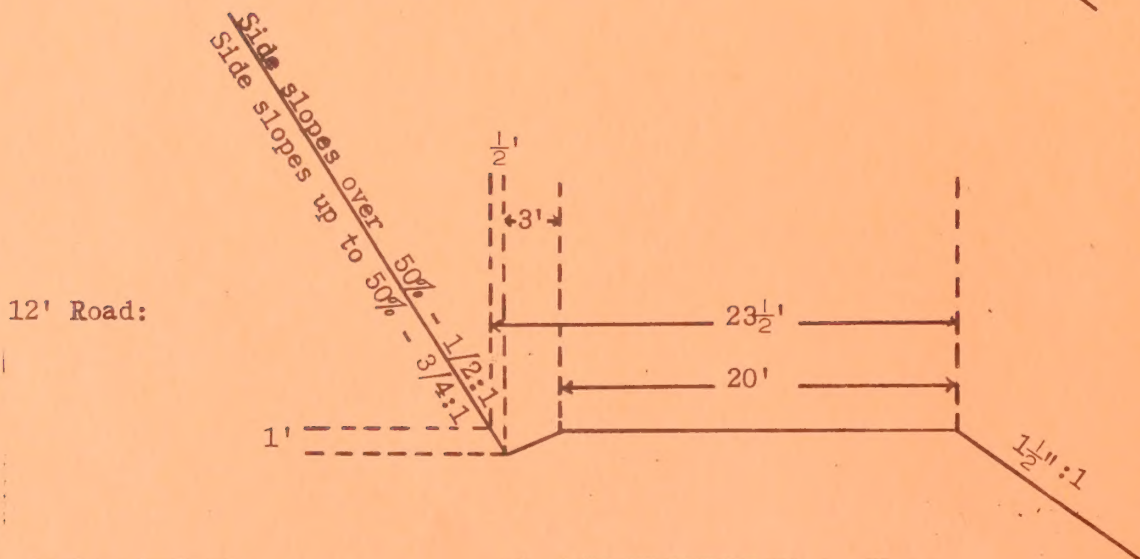
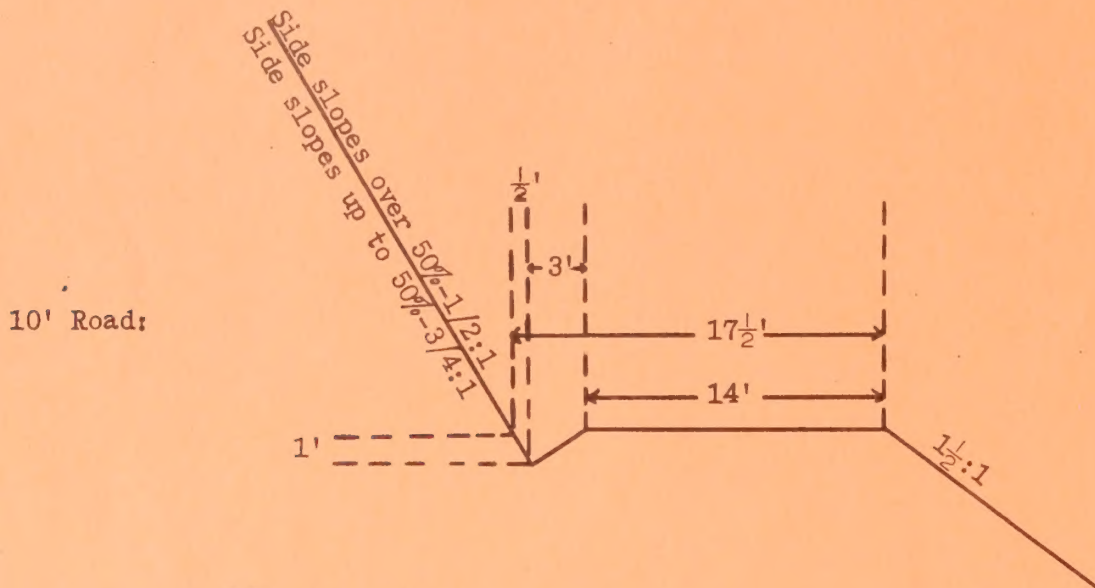
Rock is that material which must be drilled and blasted, or ripped by heavy tractor with ripper attachment, before it can be moved.

1. Common Excavation - Per Yard. Illustration 4, Table 4 cost is based upon time required for sidecasting the material with a maximum drift distance of 100 feet, mass center of cut to mass center of fill. When average freehauls will exceed 100 feet, the unit costs should be appropriately increased (Table 9), or cost allowance computed for the use of a wheel scraper (Table 10).

2. Rock Excavation - Per Yard. Illustration 4, Table 4 is an average cost of drilling and blasting or ripping, and moving the shattered rock. This cost is based upon empirical data obtained from recent studies. These studies covered a wide range of equipment and methods, including conventional drilling and blasting. Again, the maximum drift distance was 100 feet.

9333.3 - PRODUCTION COSTS  
(Schedule 19)

3. Common Excavation - Per Station. Illustration 4, Tables 5 and 6, cover cubic yardages per station for use in appraising non-designed roads. These volumes are based upon the average end areas of roads on which measurements were taken before and after construction. It may be noticed that there is considerable loss of material; these are not balanced cross sections. Average cuts at center line are included for the appraiser's information. When the actual cuts will differ appreciably from these averages, appropriate adjustments in yardage should be made. Cross sections in the studies generally conformed to the diagrams.

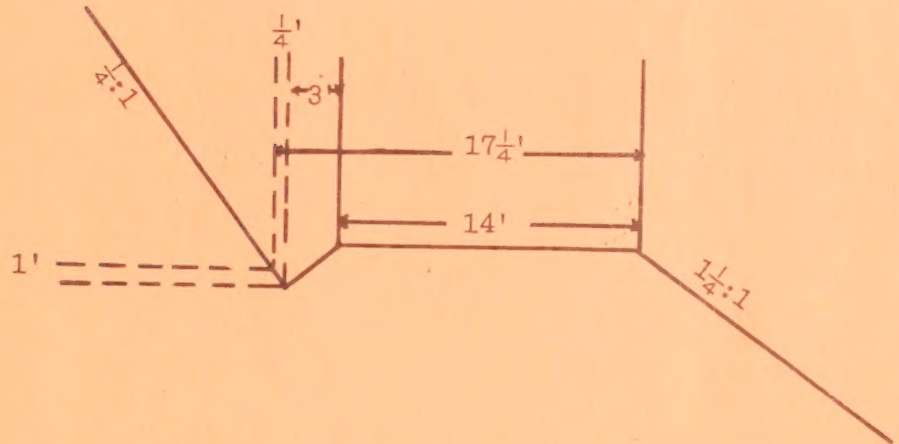




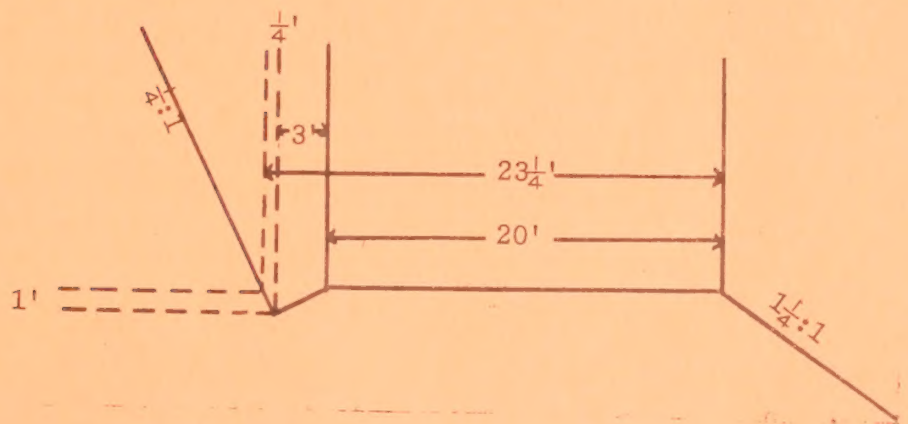
9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. Rock Excavation - Per Station. Illustration 4, Tables 5 and 6 costs for rock excavation are based upon the typical cross sections in the diagrams. Cubic yardages per station and average cuts at center-line are included.

10' Road



12' Road

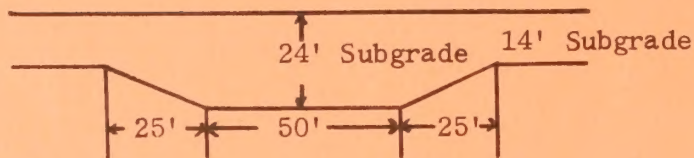


9333.3 - PRODUCTION COSTS  
(Schedule 19)

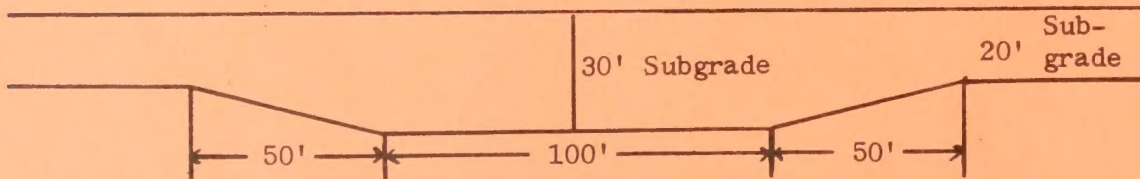
5. Turnout Excavation. Illustration 4, Tables 7 and 8 contain costs covering end areas and cubic yardages of turnout excavation determined from field measurements. The yardages represent the additional excavation beyond that required for the standard subgrade widths. Turnouts are 10 feet wider than the normal road width. For the 14 foot subgrade, the turnout is 50 feet long with a 25 foot approach at each end. The 20 foot subgrade requires a turnout 100 feet long, with two 50 foot approaches. The width of each approach ranges from 0 feet at the end which meets the standard subgrade to 10 feet where the approach joins the turnout.

Turnout Diagrams (plan view):

10' Road



12' Road





9333.3 - PRODUCTION COSTS  
(Schedule 19)

6. Drift Allowance. Illustration 4, Table 9 is intended for use as a guide for increasing tractor excavation costs when the maximum drift of material exceeds 100 feet. The percentage increases apply to tractor excavation cost only and should not be used to adjust the costs of drilling and blasting rock.

7. Excavation and End Haul. Illustration 4, Table 10 costs are based upon the machine rates and production of a pusher tractor of 270 fly-wheel horsepower and a rental self-propelled wheel scraper hauling unit of 20 cubic yards heaped capacity. This method of moving material is adapted to distances beyond the maximum effective drift of a tractor mounted dozer. When excavation and end haul costs are used, allowance must be included for moving in the wheel scraper.

8. Shovel Excavation. Illustration 4, Tables 11 and 12 costs are based upon the use of rental 3/4 yard shovel. If shovel excavation is anticipated, the appraiser must include a shovel move-in cost allowance.

E. Culverts. Illustration 4, Tables 13, 14, 15, 16 and 17 list costs of culverts. The cross-sectional area, usual gage and installed price per foot are given for galvanized, corrugated sheet metal culvert pipe of various types and sizes. The cost shown contains allowances for basic delivered price, connecting bands, shop elliptical forming (where necessary), structural excavation, installation and backfill. Additional columns showing cost of wire strutting, wood strutting, and beveling are provided. Where strutting is required, usually on larger culverts with cover heights in excess of 10', this cost should be added to the installed price per foot. As the cost of wire strutting is considerably cheaper than wooden strutting, this cost should be used where applicable. Beveling cost covers the expense of bringing both ends of the culvert to the same bevel, 2:1 or less. Where perforated pipe is necessary, opinion is that 8" pipe will be adequate in nearly all cases. It is necessary to include gravel or crushed rock in the bed and backfill to assure drainage. All costs have been covered in the listed price.

F. Grading. Illustration 4, Table 18 is based on the use of a motor grader and the time required for finishing the subgrade and pulling the ditch or subgrades up to 20 feet in width, exclusive of ditch.

G. Surfacing.

1. Cost Factors. Illustration 4, Table 19 costs are based on the BLM time studies and averages from BPR contracts on BLM roads. When local rates or rental rates other than those listed in this schedule are used, an explanation should be required in the appraisal.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

a. Rock. Cost estimates for commercially produced crushed rock are obtained from local sources. Reliable contractors producing appropriate grade and type of rock in quantities required are contacted and price quotes requested specific to the road being appraised. The "total job" quote, i.e., cost of rock in place, is obtained whenever possible. If a "total job" quote cannot be obtained, additional costs such as hauling, spreading, etc., are obtained from other independent local contractors; from cost tables in this schedule; or calculated for the specific road.

Cost estimates for operator produced rock are used only when it is not possible or feasible to purchase rock from local supplies. The approach requires specialized experience and knowledge in crushing practices and equipment and quarry development. A definite site for each rock production quarry is required when using this approach.

Cost estimates for pit and bar run rock are developed for the specific road using local equipment rental rates and production rates.

b. Loading. Loading costs are intended as allowances where hauling from pit is contemplated. Costs are based on rental rate of the dump truck and ownership of a 2 to 2-1/2 cubic yard front end loader.

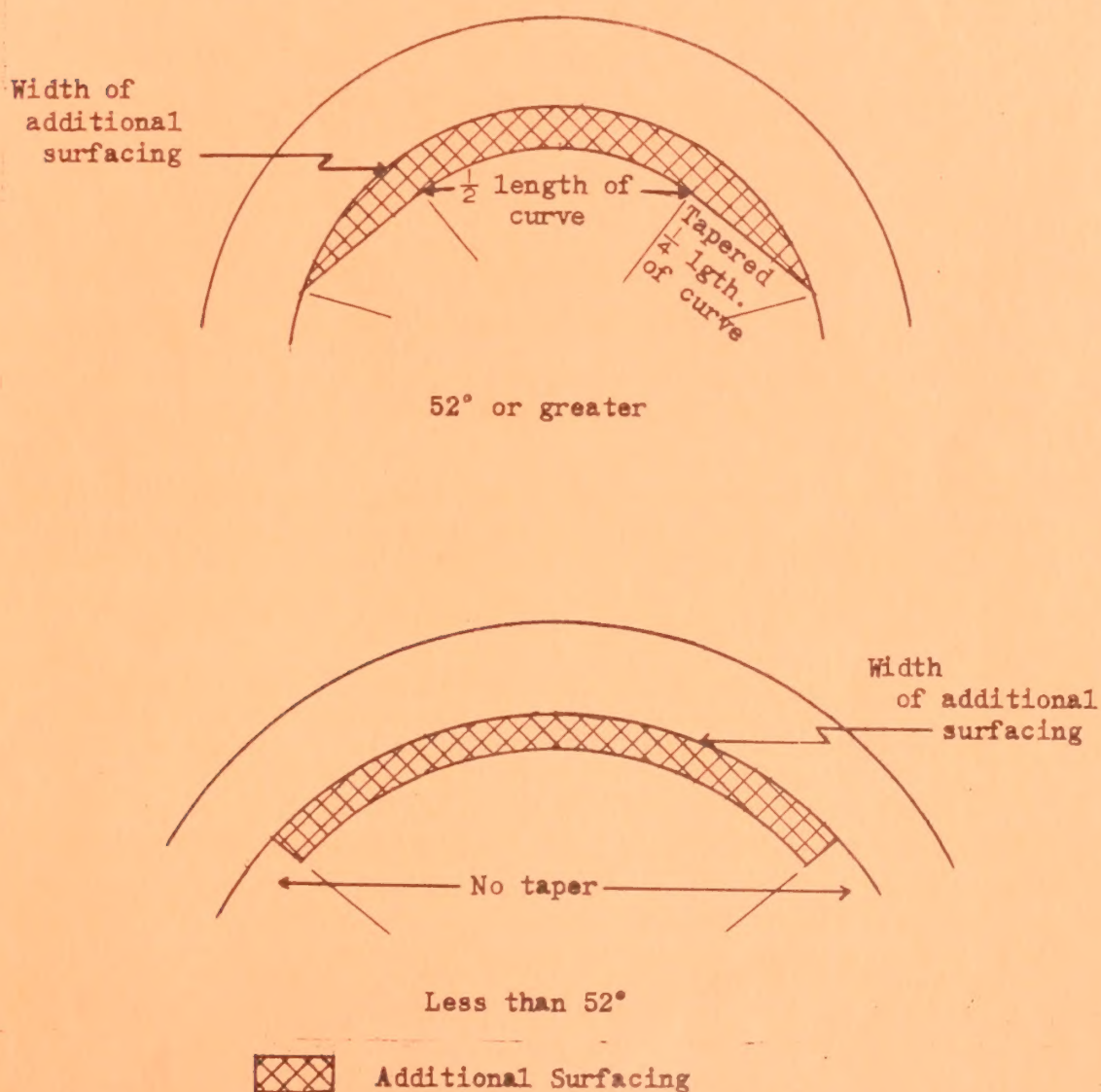
c. Hauling. No appreciable differences were found between hauling times on "green" (non-compacted) and "solid" (compacted) roads. If the road is soft enough to impede hauling, present BLM requirements would deny the purchaser credit for surfacing prior to compaction. In effect then, there should be no hauling over "green" roads. If an unusual situation should require hauling over a soft roadbed, the appraiser should use his best judgment in estimating an adequate allowance for the additional cost. Costs are based on rental of the 10 to 12 cubic yard medium size dump truck.

d. Spreading. Spreading cost is on a per lift basis, i.e., for surfacing applied in two lifts, double the allowance. Costs are based on the road construction contractor owning the motor grader.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

2. Material Volume Determination. Charts 1 and 2 are for use in making estimates for road surfacing when procurement, hauling, spreading, and rolling of crushed aggregate or pit run rock are required under the terms of the timber sale contract. The charts show volumes for various road widths and compacted depths of rock. These volumes are based on surface edges sloped at 3 to 1 and a compaction factor of 1/3. Volumes listed in the table on fill widening are based on width increases of one and two feet, on one side of centerline only. On complete fills (no bench), an allowance must be made for each side. Volumes in the table on surface widening on curves are based upon the designs diagrammed below.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Chart 1 - Road Construction Surfacing

CUBIC YARDS  $\frac{1}{3}$  OF AGGREGATE PER 100' STATION

Usable Surfaced Road Width-Ft.	Compacted Depth in Inches									
	2	3	4	6	8	10	12	14	16	18
10	9	13	18	28	39	51	64	78	92	107
12	10	16	21	33	46	60	74	89	105	122
14	12	18	25	38	53	68	84	101	118	137
20	17	26	35	53	72	92	113	135	158	181
24	24	31	41	63	86	109	133	158	184	211

CUBIC YARDS  $\frac{1}{3}$  OF AGGREGATE PER TURNOUT  $\frac{2}{3}$

Length of Turnout - Feet	Compacted Depth in Inches									
	2	3	4	6	8	10	12	14	16	18
50 $\frac{3}{4}$	6	9	12	19	25	31	37	43	50	56
100 $\frac{4}{4}$	12	18	24	38	50	62	74	86	99	111

CUBIC YARDS  $\frac{1}{3}$  OF AGGREGATE PER 100' STATION OF TURNOUT  $\frac{5}{3}$

Cu. Yds./ 100 ft. of Turnout	Compacted Depth in Inches									
	2	3	4	6	8	10	12	14	16	18
	8	12	16	25	33	41	49	57	66	74

$\frac{1}{3}$  These figures are  $\frac{1}{3}$  higher than loose rock yardages (compaction allowance) and include allowance for edges sloped at 3:1.

$\frac{2}{3}$  Volumes related to length of turnout only; no relationship to class of road.

$\frac{3}{3}$  Includes volumes for two 25-foot approaches.

$\frac{4}{3}$  Includes volumes for two 50-foot approaches.

$\frac{5}{3}$  This table for use where turnout lengths vary.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Chart 2 - Road Construction Surfacing

SURFACE WIDENING ON FILLS -  
CUBIC YARDS OF AGGREGATE PER 100' STATION 1/

Extra Width - Feet	Compacted Depth in Inches									
	2	3	4	6	8	10	12	14	16	18
1	1	1	2	3	3	4	5	6	7	7
2	2	3	3	5	7	8	10	12	13	15

1/ Volumes for widening on one side of centerline only. On complete fills (no bench), make allowance for both sides.

SURFACE WIDENING ON CURVES -  
CUBIC YARDS OF AGGREGATE PER 100' STATION

Compacted Depth in Inches	Degree of Curve	8-21	22-35	36-51	52-64	65-75
	Extra Width in Feet	1	2	3	4	5
2		1	2	3	3	3
3		1	3	4	4	5
4		2	3	5	5	6
6		3	5	7	7	9
8		3	7	10	10	12
10		4	8	12	12	15
12		5	10	15	15	19
14		6	12	17	17	22
16		7	13	20	20	25
18		7	15	22	22	28

9333.3 - PRODUCTION COSTS  
(Schedule 19)

H. Road Maintenance. This cost allowance item consists of surface blading, ditch pulling, drainage upkeep and repair, slide removal, roadside brushing, roadside stabilization and gravel replacement costs. Determination of these costs as appraisal allowances should be based on condition surveys of the particular roads to be used.

Illustration 4, Table 20, contains a complete cost schedule for all items of road maintenance applicable for average and usual conditions.

1. Cost Factors.

a. Surfaced Roads. This represents an average cost of Bureau of Public Roads maintenance, including current work. Amortization of surface replacement (wear) costs should be based upon current State Office instructions.

b. Unsurfaced Roads. This allowance should be sufficient to cover surface blading, ditch and culvert cleaning, slough removal and incidental work. It should not include costs of removal of major slides, heavy brush eradication or other extraordinary work.

c. Other Allowances. Where necessary and practical, allowances may be made for watering both surfaced and unsurfaced roads. When slides of major proportions must be removed, additional costs must be included. Slide removal costs and the costs of eradicating heavy roadside brush should be computed by district personnel on the basis of the best local information currently available.

2. Machine Rate Determination. When the condition survey indicates costs other than those in Table 20, the appraiser will estimate costs particular to the road being considered. In cases when a motor grader, road roller, shovel, dump truck or other equipment not normally owned by a contract logger is required, rental rates, either those in this schedule or local rates, shall be used.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

.36 Fire Protection and Hazard Reduction.

A. Fire Protection. Illustration 5, Table 1 cost allowances are based on a fire season of eight months during which the tools and equipment must be ready for use. In addition, a watchman is required part time during a four-month period in midsummer. Since it is impossible to determine which part of the year a sale will be logged, the maximum allowance is made. Illustration 5, Table 2 cost schedule covers tractor and hand trail fire line construction.

B. Hazard Reduction. Illustration 5, Table 3 costs were developed from data on 140 slash burns covering some 8024 acres of Bureau of Land Management land in western Oregon. The data were collected by Bureau of Land Management foresters on a wide range of conditions in weather, topography, site, etc. Since manpower costs are by far the most costly item in slash burning, it was decided to determine what effect, if any, slope, aspect, volume per acre, acres, percent recovery, slash concentration, and logging methods, would have on the man hours required to burn a sale. When the analysis was completed, it was apparent that only one variable--acres, or the size of the burn--had any significance. This is not to say that other factors do not, in actual practice, affect the time required to burn. What it does mean is that there are unknown or unpredictable factors, such as weather, involved which tend to minimize the importance of the known, predictable ones. The table covers only burning clear cut areas. The term "clear cut acres" is defined as the total clear cut acreage in the sale. Costs should not be applied on a unit-by-unit basis. This table is constructed so that no interpolation is necessary.

In Table 3, the man hours per acre were determined on various sizes of burns and an average wage rate applied giving a labor cost per acre. Machine and fuel costs were added and the resulting burning cost per acre divided by volumes per acre to yield a cost per MBF.

## 9333.3 - PRODUCTION COSTS

(Schedule 19)

.37 Other Allowances.

A. Seeding and Planting (Eastern Oregon). Illustration 6, Table 1, list seeding and planting and thinning costs based on BLM experience in eastern and western Oregon. When this activity is a contractual requirement of a timber sale contract, these costs should be used for estimating appraisal allowances unless in the appraiser's judgment other local costs are more representative for the required work. The basis for estimating any other allowances shall be recorded in the appraisal file.

B. Stream Clearing. It is sometimes necessary to require that the timber purchaser remove cull material from a stream channel to allow passage of anadromous fish or to improve drainage. Appraisal allowances for such contractual requirements may be computed by treating the cull material to be yarded as additional gross merchantable volume with no net recovery.

A reasonably accurate estimate of the gross cull volume is essential. The total cost of yarding this volume by the means anticipated (tractor, high-lead, etc.) should be estimated in the same manner as for gross merchantable volume. This cost figure is carried into the yarding cost summary and becomes part of the total move-in, rigging, yarding and loading cost. Thus, the additional expense of "gross" yarding is reflected in the unit cost per MBF net volume.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

.38 Western Oregon Manufacturing. Cost allowances pertaining to the manufacture of lumber and chips in Illustrations 7 and 8 are developed from a model mill synthesized by the Bureau of Land Management. In the model, an attempt is made to represent an "average" mill in the western Oregon Douglas-fir region cutting predominantly Douglas-fir. The mill is also designed to manufacture associated species to the degree common in the region. The mill specifications are considered near minimum of those required to reach the utilization degree and realizations inherent in the grade recovery studies used in predicting average log selling values in our appraisal system. The mill has the following specifications:

Capacity per 8-hour shift - 100 MBF  
Head saw - single cut band  
Mill equipped with chipper and dry kilns

Cost allowance for the manufacture of plywood is developed from costs experienced by plywood producers in the Douglas-fir region. The allowances are obtained from average costs of plywood plants reported to the American Plywood Association.

Plywood chip cost allowances for the conversion are developed from average costs experienced by local mills and plants reported to the Bureau of Land Management and Forest Service.

A. Douglas-fir Manufacturing Costs in Illustration 7 (Tables 1 thru 6) are made up of three components. These costs are for the manufacture of (1) lumber, developed from the BLM model mill; (2) plywood, obtained from costs experienced by plywood plants; and (3) chips, developed from the BLM model mill and average costs experienced by local manufacturers.

1. Weights by manufacture in Table 1 determines the extent that lumber and plywood costs are applied to individual log grades. Since some of the volume in each log is sawn and some is peeled, it is necessary to determine proportions of each log grade to be manufactured into lumber and plywood. These proportions (Table 1) are assumed to represent industry-wide practices.

2. Thinning manufacturing costs in Table 2 are developed from the BLM model mill for log grades and sizes of logs predicted to come from thinning type timber, i.e., smaller diameter sawlogs.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

3. Plywood, Lumber, and Chip manufacturing costs in Table 3 are appropriate for the conversion of average old-growth and second-growth stands except for thinnings and manufacturing options. These costs reflect the weights of manufacture contained in Table 1.

Allowances by log grades, on pages 1 and 2, are adjusted for mill scale defect using "Defect Allowances" listed on page 3 of Table 3. The mill scale defect represents the cruiser/appraiser estimate of the percent difference (log scale) between the mill deck scale net and gross. For example, if the gross log scale is 100 board feet and the net log scale is 85 board feet, then the mill scale defect is 15%. The more commonly used defect factor (obtained from the cruise report) is the reciprocal of the ratio of net merchantable volume to gross merchantable volume. This factor is used in the manufacturing cost report (see 38.C. below). Other means of estimating mill scale factors include: averages determined from localized scaling studies, i.e., administrative check scales, scaling at mill studies, and cruiser's estimate. However, it must be appropriate for the specific tract involved.

4. Lumber and Chip manufacturing costs in Table 4 reflect total manufacturing costs except for plywood production. These costs are appropriate for the "lumber only" option of appraising smaller diameter harvest cuts where the majority of the trees in the tract are smaller than average for the old growth stands, and the most practical utilization center is limited to a sawmill.

The mill scale recovery percentage is the reciprocal of the "mill scale defect" factor derived above (see 38.A.4). It is determined in much the same way as the mill scale defect, using the most reliable means and data. In the manufacturing report (see 38.C below) the same ratio of net gross merchantable to net merchantable is used for lumber only as is used for weighted lumber and plywood.

5. Plywood and Chip manufacturing costs contained in Table 5 are used more for references than for actual application. The table contains total costs of manufacture excluding lumber production. Caution! These costs are not used for the appraisal option of "plywood sheathing only" (refer to Table 6).

6. Plywood Sheathing manufacturing costs in Table 6 are appropriate for the "plywood sheathing only" appraisal option where the majority of trees in the tract are smaller than average for old growth stands and the most practical utilization center is limited to a specialized veneer-plywood mill.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

B. Associated Species manufacturing costs in Illustration 8, Tables 1 through 3, are based on lumber costs developed from the BLM model mill, and chip costs experienced by local manufacturers in the region.

1. Thinnings. Manufacturing costs for hemlock and true firs in Table 1 are developed from the BLM model mill for log sizes and grades of thinning type timber, ie., small diameter sawlogs.

2. Hemlock Lumber and Chip manufacturing costs in Table 2 pertain only to western Oregon hemlock.

3. True fir and Cedar Lumber and Chip manufacturing costs in Table 3 are appropriate for all species of western Oregon true firs and cedars. Notice! Under usual conditions, Port-Orford-cedar is sold as export logs at dockside prices. Table 3 costs are not appropriate for Port-Orford-cedar.

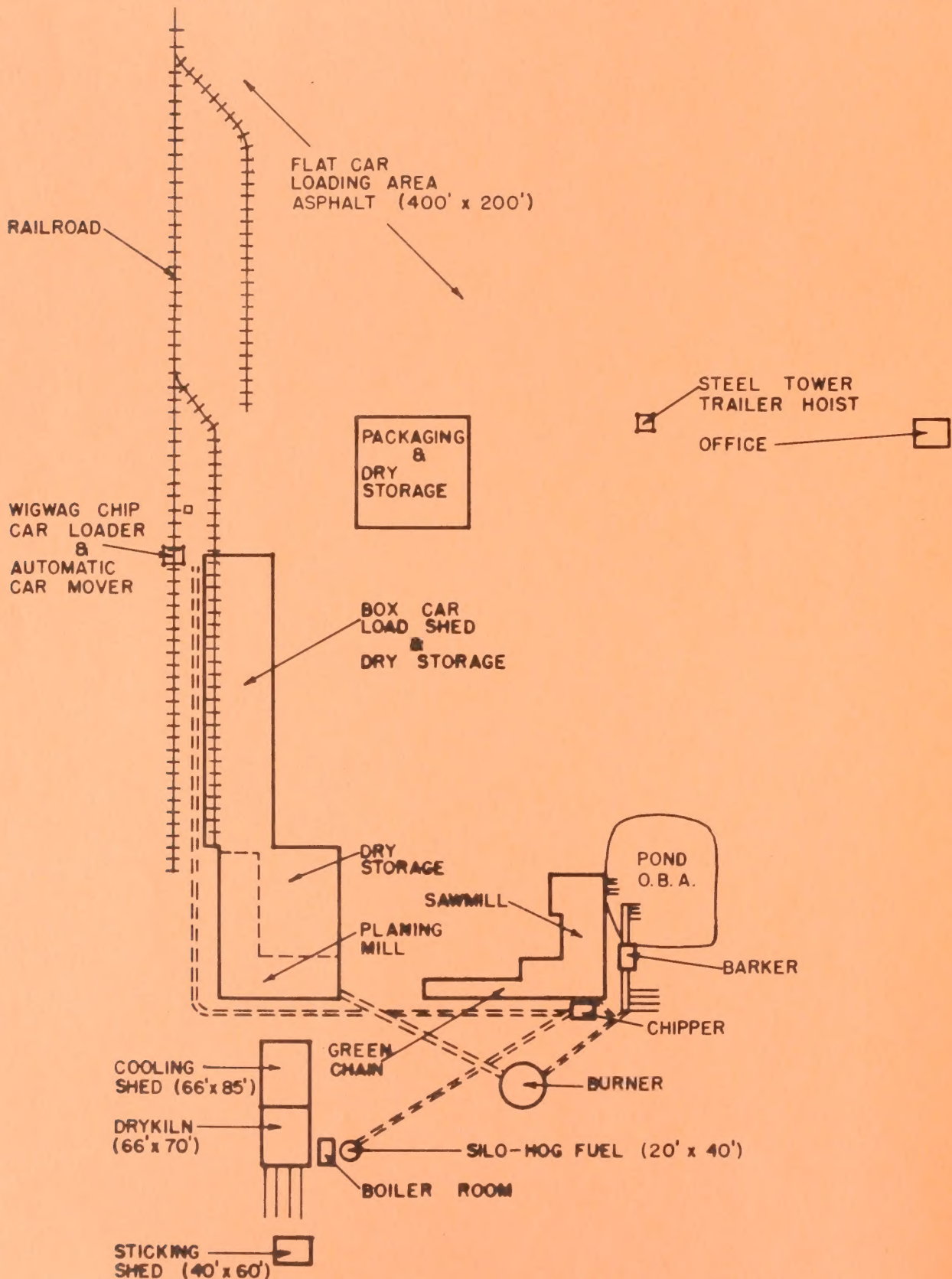
C. Manufacturing Cost Report. Each cruise report generates corresponding manufacturing cost report (note format of report in Appendix II-E).

1. Report for 100% cruises has the following characteristics. Costs are computed to the nearest 10¢ per M (net log scale). Calculations include lumber, plywood and chip costs for Douglas-fir; for associated species they include lumber and chip costs. Whenever chip costs are not required, they must be subtracted from the computed allowances. The Douglas-fir scale defect is computed using the ratio of net gross merchantable to net merchantable. If a different mill scale defect allowance is required, it must be calculated manually.

2. Reports for 3P cruises have the following characteristics. Costs are computed to the nearest 1¢ per M (net log scale). Calculations include all costs, i.e., lumber and chips and plywood when appropriate. Chip costs must be subtracted if they are not required. The Douglas-fir scale defect is computed using the ratio of gross merchantable to net merchantable. If a different defect allowance is used, it must be recomputed.

# DOUGLAS FIR SAWMILL LAYOUT

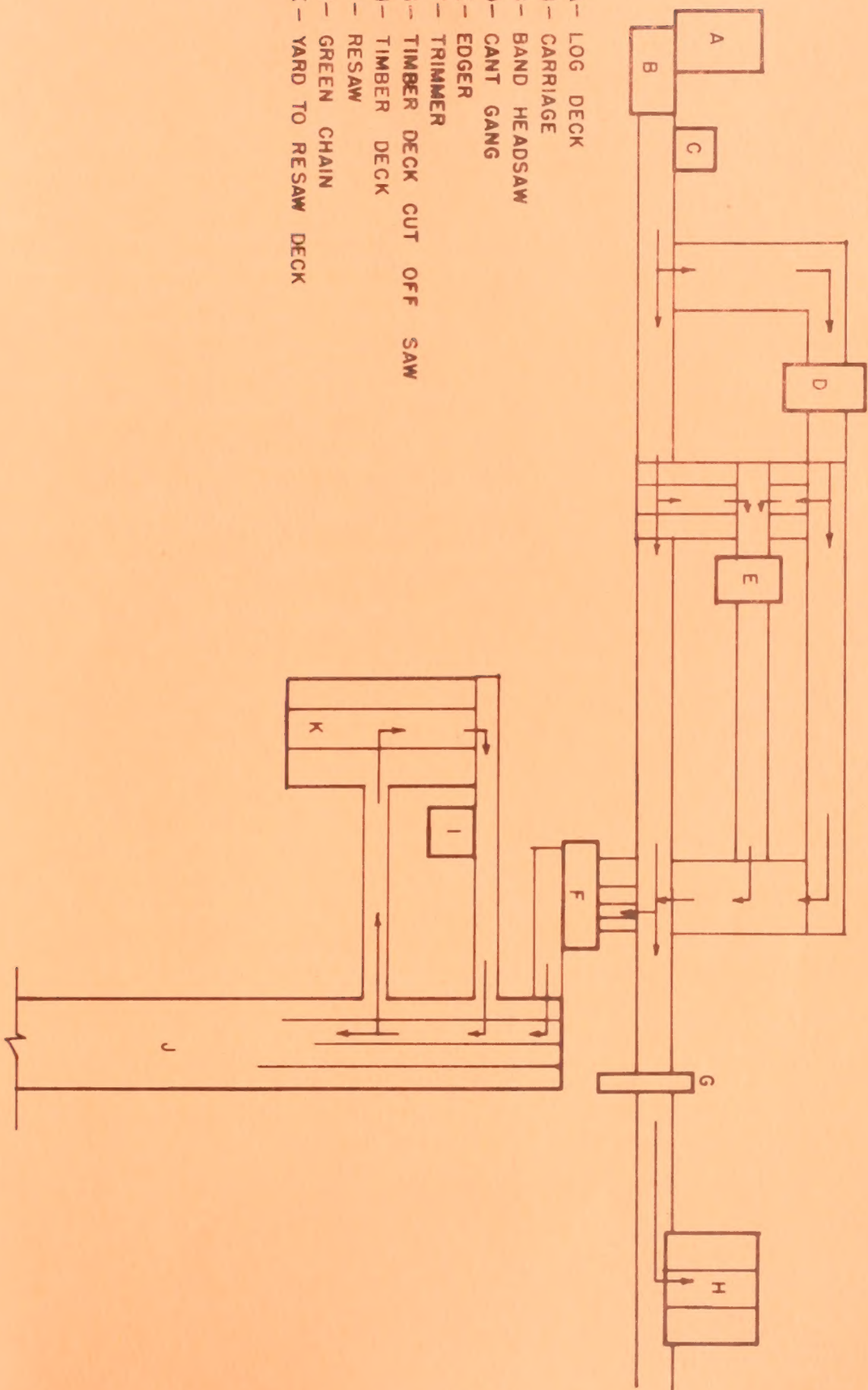
LAND 25 ACRES





# SAWMILL LAYOUT

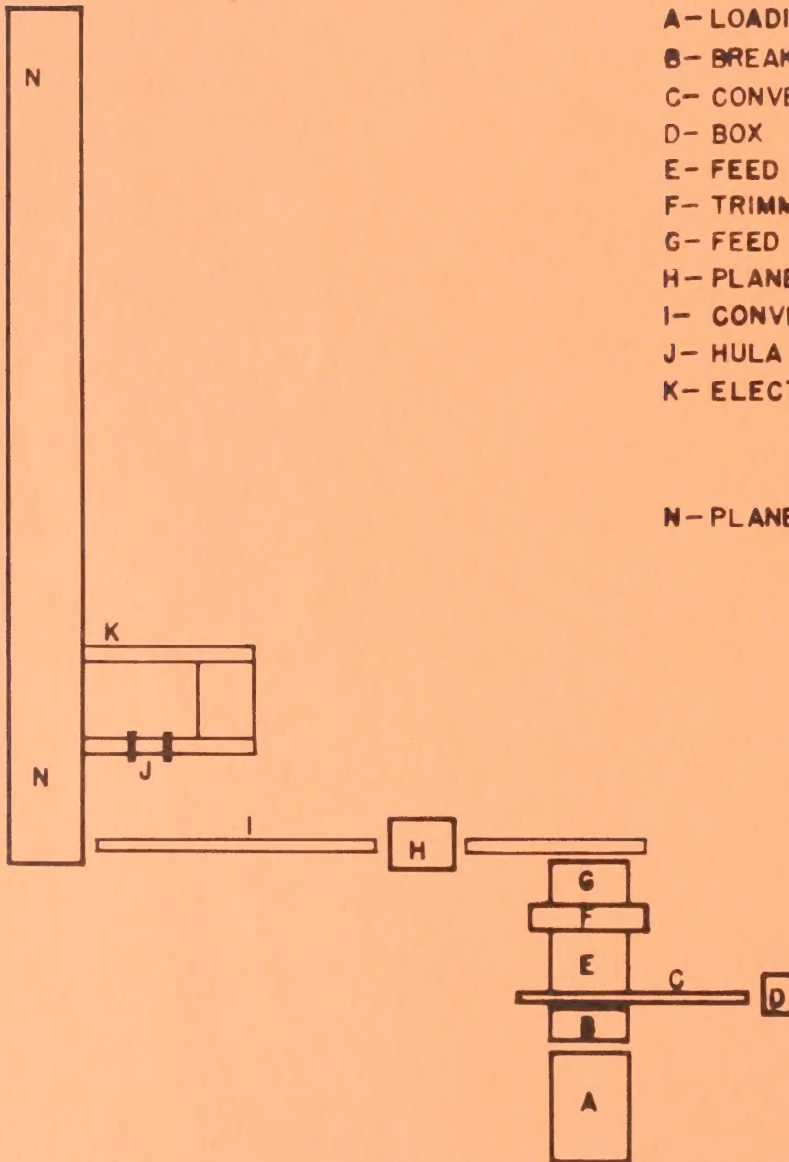
- A-- LOG DECK
- B-- CARRIAGE
- C-- BAND HEADSAW
- D-- CANT GANG
- E-- EDGER
- F-- TRIMMER
- G-- TIMBER DECK CUT OFF SAW
- H-- TIMBER DECK
- I-- RESAW
- J-- GREEN CHAIN
- K-- YARD TO RESAW DECK



## PLANING MILL

A-LOADING TABLE  
B-BREAKDOWN HOIST  
C-CONVEYOR FOR STICKERS  
D-BOX FOR STICKERS  
E-FEED TABLE  
F-TRIMMER  
G-FEED CHAINS  
H-PLANER  
I-CONVEYOR BELT  
J-HULA SAWS (RETRIM)  
K-ELECTRIC SWEDE

N-PLANER CHAIN





9333.3 - PRODUCTION COSTS  
(Schedule 19)

.39 Eastern Oregon Manufacturing. Lumber manufacturing cost allowances in Illustration 9, Table 1 are developed from a synthesized model east side "Ponderosa pine" mill. The model, representative of mills in the pine region of Oregon, is designed to manufacture Ponderosa pine and associated species common in the region. The mill specifications are considered adequate to develop realizations compatible with recovery studies used in predicting average log selling values in our appraisal system. The eastside pine mill has the following specifications.

Capacity per 8-hour shift - 70 MBF  
Head saw - single cut band  
Mill equipped with dry kilns  
(barker and chipper available)

A. Pine and Associated Species manufacturing costs in Table 1 are appropriate for the following species.

Ponderosa, sugar and western white pine  
East side white fir  
East side Douglas-fir  
Western larch

Manufacturing costs for other species (except Lodgepole pine) must be developed empirically by the appraiser. The mill scale recovery percentage represents the cruiser/appraiser estimate of the percentage of recoverable wood (log scale) or difference between the gross mill deck scale and the mill scale defect deduction, i.e., net mill scale. For example, if the gross log scale is 100 board feet and the defect deduction is 20 board feet, then the mill scale recovery percentage is 80%. The more commonly used mill scale recovery factor (obtained from the cruise report) is the ratio of net gross merchantable to net merchantable. This factor is used in the manufacturing cost report (see 39.C below). The appraiser may estimate this recovery factor instead of using the above ratio if he has more reliable data.

B. Lodgepole pine manufacturing costs are developed from costs collected by the Forest Service from representative mills.

C. Manufacturing Cost Report. Each cruise report generates a corresponding manufacturing cost report for each individual species. (See Example in Appendix II-E). Manufacturing costs by species are computed to the nearest 10¢ per M (net log scale). All computed costs include chip costs. The mill scale recovery percent included in the computation is the ratio of net gross merchantable to net merchantable. If a different mill scale recovery percentage is desired, it must be calculated manually.

UNLOADING DOCK

POND  
APPROX. 3 ACRES

DRY KILNS  
1. DOUBLE 30'-7" x 66'  
2. SINGLE 17'-7" x 66'

COOLING SHED  
(64' x 70')

WAREHOUSE  
(50' x 100')

OFFICE  
(50' x 50')

FUEL BIN (20' x 50')

BOILER  
ROOM  
(50' x 50')

DRY SORTER  
(80' x 150')

DRY STORAGE  
(160' x 160')

TOILET (15' x 20')

GREEN CHAIN (200' x 30')

SAWMILL  
(60' x 140')

BURNER  
50' DIA.  
50' HIGH

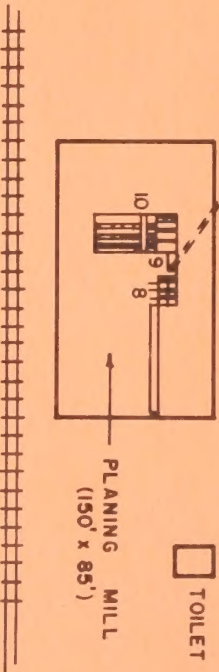
## PONDEROSA PINE SAWMILL

### LEGEND

1. DECK CUTOFF SAW
2. CARRIAGE
3. HEADSAW
4. BAND RESAW
5. EDGER
6. TRIMSAW
7. DRY SORTER LOAD BREAKDOWN HOIST
8. PLANING MILL LOAD BREAKDOWN HOIST
9. PLANING MACHINE
10. PLANING MILL TRIM SAW

TOILET 05' 20')

PLANING MILL  
(150' x 85')





# TIMBER APPRAISAL PRODUCTION COST TABLES

## SCHEDULE 19

ILLUSTRATION 1  
Falling & Bucking

ILLUSTRATION 2  
Rigging Yarding & Loading

ILLUSTRATION 3  
Transportation

ILLUSTRATION 4  
Road Construction & Maintenance

ILLUSTRATION 5  
Fire Protection & Hazard Reduction

ILLUSTRATION 6  
Other Allowances

ILLUSTRATION 7  
Western Oregon Douglas Fir Manufacturing

ILLUSTRATION 8  
Western Oregon Associated Species Manufacturing

ILLUSTRATION 9  
Eastern Oregon Manufacturing





History of Bucking





*Dealy*

IN REPLY REFER TO:

UNITED STATES GOVERNMENT

DEPARTMENT OF THE INTERIOR

9300

*Memorandum*

BUREAU OF LAND MANAGEMENT

District Office

P. O. Box 10226

Eugene, Oregon 97401

DATE: March 26, 1975

TO : Area Managers

FROM : District Appraiser

SUBJECT: Falling Costs -- Timber Appraisals

Disregard the instructions given March 17 referring to stem count as used in falling costs.

Starting with the June sales use only merchantable trees to calculate stems/acre.

Also, to keep the district consistent we will use the following method to calculate the allowance for stems/acre.

$$\begin{array}{l} \text{Stems/acre} \\ \left( \frac{48}{10} \right) = 4.8 \times 0.10 = .48 \end{array}$$

Some have been rounding the 4.8 to the nearest whole number, but in the future carry it to the nearest 1/10th.

cc: Tech Section

*R. S. Dealy*





## United States Department of the Interior

5300

9350

BUREAU OF LAND MANAGEMENT

District Office

P. O. Box 10226

Eugene, Oregon 97401

February 9, 1977

Instruction Memorandum No. EG-77-2

Expires: 12/31/77

To: Area Managers, Principal Cruisers, Area Silviculturists

From: District Manager

Subject: Falling Costs, 4 and 8 Inch Stems, and Poisoning Allowances  
for Maple Trees

To eliminate confusion and to allow for better stem counts of the merchantable trees, it has been decided to drop the requirement that cruisers tally 4 and 8 inch stems. In addition, maple stems will no longer be tallied for the purpose of poisoning allowances.

The attached tables were developed on the basis of an analysis of F.Y. 1976 sales and will be used for future sales. The cruiser will have three choices of what allowance to use based on his estimate of the number of 4 and 8 inch stems per acre. The area silviculturist will identify those sales requiring maple stump treatment. Once that need is identified, the cruiser will again base his poisoning allowance using the attached table.

Enclosure



Acting

2-9-77





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Eugene District Allowances for Maple Stump  
Treatment and Falling Costs for 4 & 8 Inch Stems

4 & 8" Stems (INCLUDING HARDWOODS)

High # of stems per acre	40 stems @ \$.50 = \$20.00 per acre
Average # of stems per acre	15 stems @ \$.50 = \$ 7.50 per acre
Low # of stems per acre	5 stems @ \$.50 = \$ 2.50 per acre

Maple Poisoning

High # of maple stems per acre	20 stems @ \$.20 = \$ 4.00 per acre
Average # of maple stems per acre	10 stems @ \$.20 = \$ 2.00 per acre
Low # of maple stems per acre	5 stems @ \$.20 = \$ 1.00 per acre

The above allowances for falling 4 & 8 inch stems are to be used when the contract will require these trees to be felled concurrently with all other trees. In sales where 4 and 8 inch stems will be cut following yarding, 1/2 of the table allowance should be used.





9333.3 - PRODUCTION COSTS

(Schedule 19)

FALLING AND BUCKING

TABLE 1

FALLING AND BUCKING  
WESTERN OREGON

COSTS IN DOLLARS PER MBF GROSS VOLUME 1/

NO. OF 16" LOGS	PER CENT TOP LOSS 2/									
	0	5	10	15	20	25	30	35	40	45
1	11.25	11.15	11.00	10.90	10.75	10.65	10.55	10.40	10.30	10.20
2	9.20	9.10	8.95	8.85	8.75	8.60	8.50	8.40	8.25	8.15
3	7.40	7.30	7.20	7.05	6.95	6.85	6.70	6.60	6.50	6.35
4	5.90	5.80	5.70	5.55	5.45	5.35	5.20	5.10	5.00	4.85
5	4.70	4.55	4.45	4.35	4.20	4.10	4.00	3.85	3.75	3.65
6	3.75	3.60	3.50	3.40	3.25	3.15	3.05	2.90	2.80	2.65
7	3.05	2.95	2.80	2.70	2.55	2.45	2.35	2.20	2.10	2.00
8	2.65	2.50	2.40	2.30	2.15	2.05	1.90	1.80	1.70	1.55
9	2.50	2.35	2.25	2.15	2.00	1.90	1.80	1.65	1.55	1.45
50										

1/ SUBTRACT \$0.10 FOR EVERY 10 STEMS PER ACRE.  
2/ PER CENT TOP LOSS IS THE ESTIMATED AVERAGE VOLUME LOSS IN THE UPPER STEM FROM BREAKAGE AND ROT EXPRESSED AS A PER CENT OF GROSS VOLUME. THIS ESTIMATE CAN ONLY BE MADE BY THE CRUISER.

TT #ORE-24-187

BASIC DATA, APPENDIX 1, PAGES 66, 67 & 247

$$\frac{\text{Stems/Acre}}{10} = \frac{45}{10} \times 10 = 4.5$$

$$\frac{45}{10} = 4.5 \times 10 = 45$$

9333.3 - PRODUCTION COSTS  
(Schedule 19)

FALLING AND BUCKING  
Eastern Oregon

TABLE 2

Costs in Dollars per MBF Net Merchantable Volume 1/

Per cent of  
Recovery 2/

100	\$6.60
95	6.85
90	7.00
85	7.20
80	7.40
75	7.70
70	7.90
65	8.15
60	8.40
55	8.70
50	8.95

1/ To nearest five cents.

2/ Per cent recovery expressed as the ratio of net merchantable volume to gross merchantable volume.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

FALLING AND BUCKING

TABLE 3

UNMERCHANTABLE TREE AND SNAG FELLING

Western Oregon

D.B.H.	Cost in Dollars per Stem <sup>1/</sup>
4 <sup>1/2</sup>	.20
8	\$0.65
12	1.05
16	1.50
20	1.90
24	2.35
28	2.75
32	3.20
36	3.60
40	4.05
44	4.45
48	4.90
52	5.30
56	5.75
60	6.15
64	6.60
68	7.00
72	7.45
76	7.90
80	8.30
84	8.70
88	9.15
92	9.60
96	10.00
100	10.45

<sup>1/</sup> To nearest five cents.

Basic data, Appendix 1, Pages 66, 67 & 248

9333.3 - PRODUCTION COSTS  
(Schedule 19)

FALLING AND BUCKING

TABLE 4

UNMERCHANTABLE TREE AND SNAG FELLING  
EASTERN OREGON

<u>D.B.H.</u>	Cost in Dollars per Stem <sup>1/</sup>
8	\$0.55
12	0.90
16	1.20
20	1.60
24	1.95
28	2.30
32	2.65
36	3.00
40	3.35
44	3.70
48	4.05
52	4.40
56	4.75
60	5.10
64	5.45
68	5.80
72	6.15
76	6.50
80	6.85
84	7.20
88	7.55
92	7.90
96	8.25
100	8.60

<sup>1/</sup> To nearest five cents

Basic data, Appendix 1, Pages 70, 71 & 248



9333.3 - PRODUCTION COSTS

(Schedule 19)

FALLING AND BUCKING

TABLE 5

FALLING AND BUCKING - COMMERCIAL THINNINGS  
WESTERN OREGON

COSTS IN DOLLARS PER TREE 1/

D.B.H. INCHES	NUMBER OF 16-FOOT LOGS TO 5-INCH TOP										
	1	2	3	4	5	6	7	8	9	10	11
8	1.55	1.55	2.00	2.00							
10	1.70	1.70	2.15	2.15	2.60						
12	1.90	1.90	2.35	2.35	2.80						
14	2.10	2.10	2.60	2.60	3.05	2.80	3.50				
16	2.40	2.40	2.85	2.85	3.30	3.30	3.75	3.75			
18		2.70	3.15	3.15	3.60	3.60	4.05	4.05			
20		3.00	3.50	3.50	3.95	3.95	4.40	4.40	4.85		
22		3.40	3.85	3.85	4.30	4.30	4.75	4.75	5.20	5.20	
24		3.80	4.25	4.25	4.70	4.70	5.15	5.15	5.60	5.60	6.10
26			4.70	4.70	5.15	5.15	5.60	5.60	6.05	6.05	6.50
28			5.15	5.15	5.60	5.60	6.10	6.10	6.55	6.55	7.00
30			5.70	5.70	6.15	6.15	6.60	6.60	7.05	7.05	7.50

1/ COSTS ARE GOVERNED BY NUMBER OF BUCKING CUTS, WITH 32-FOOT LOG LENGTH AS STANDARD FOR EACH CUT.

BASIC DATA, APPENDIX 1, PAGES 68, 69, 249 & 250





splicing, loading &  
ripping

9333.3 - PRODUCTION COSTS  
(Schedule 19)

RIGGING, YARDING AND LOADING

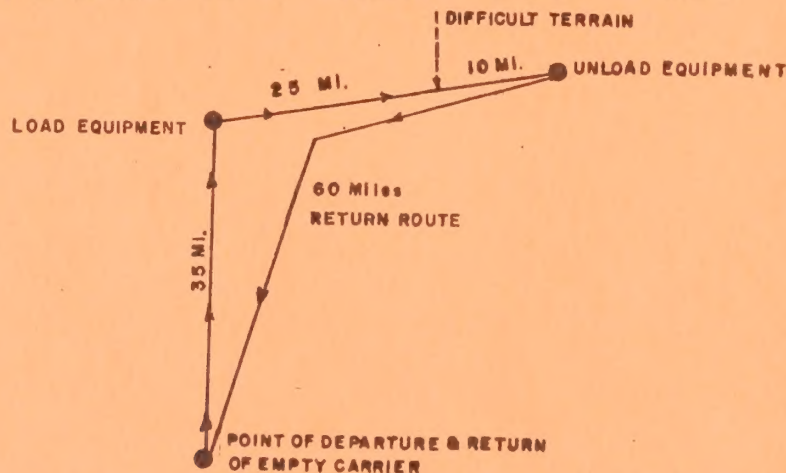
TABLE 1 (Cont')

1/ The average moving distance is assumed to be 35 miles. However, static skyline logging shows tend to be widely scattered, and loggers equipped for them are few. Moving distances vary greatly, but are generally much longer than for conventional logging. Thus, skyline move in costs are shown here in terms of dollars per mile of moving distance rather than as total cost for moving each machine. Probably the appraiser can make a reasonably accurate prediction of moving distance for a given timber sale area. If not, 125 miles is suggested as an average moving distance.

2/ Move in costs were computed for these conditions:

- (1) The equipment will be actually moved 35 miles
- (2) The empty truck rate is allowed for 60 miles
- (3) Travel over mountainous or difficult terrain - 10 miles.

An example is:



The additional empty distance is used because many small communities which furnish manpower for logging do not have commercial hauling equipment capable of handling cats, etc. These have to be obtained from sources farther away. Basic Data Appendix 1, Pages 72 thru 93



9333.3 - PRODUCTION COSTS  
(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 2

MOVE IN LOGGING EQUIPMENT  
EASTERN OREGON

<u>Machine</u>	<u>Move In Allowances</u>
Yarding Crawler Tractor Caterpillar D7F w/power shift	\$165
Mobile Log Loader Link Belt - TL-98	505
Mobile Yarder Loader Washington Trakloader TL-6	165

Basic Data Appendix 1, Pages 94 thru 99

9333.3 - PRODUCTION COSTS

(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 3

YARDING AND LOADING - TRACTOR OPERATIONS  
WESTERN OREGON

COSTS IN DOLLARS PER MBF GROSS VOLUME YARDED AND LOADED 1/

16 FT. LOG VOLUME SCRIB. DEC.C.	100	200	300	400	500	600	700	800	900	1000
0	27.75	28.20	28.65	29.10	29.55	30.00	30.45	30.90	31.35	31.80
10	22.95	23.40	23.85	24.30	24.75	25.20	25.65	26.10	26.55	27.00
12	19.05	19.50	19.95	20.40	20.85	21.30	21.75	22.20	22.65	23.10
14	15.85	16.30	16.75	17.20	17.65	18.10	18.55	19.00	19.45	19.90
16	13.25	13.70	14.15	14.60	15.05	15.50	15.95	16.40	16.85	17.30
18	11.15	11.60	12.05	12.50	12.95	13.40	13.85	14.30	14.75	15.20
20	9.45	9.90	10.35	10.80	11.25	11.70	12.15	12.60	13.05	13.50
22	8.05	8.50	8.95	9.40	9.85	10.30	10.75	11.20	11.65	12.10
24	6.90	7.35	7.80	8.25	8.70	9.15	9.60	10.05	10.50	10.95
26	5.95	6.40	6.85	7.30	7.75	8.20	8.65	9.10	9.55	10.00
28	5.35	5.80	6.25	6.70	7.15	7.60	8.05	8.50	8.95	9.40
30	4.90	5.35	5.80	6.25	6.70	7.15	7.60	8.05	8.50	8.95
35	4.10	4.55	5.00	5.45	5.90	6.35	6.80	7.25	7.70	8.15
40	3.65	4.10	4.55	5.00	5.45	5.90	6.35	6.80	7.25	7.70
45	3.45	3.90	4.35	4.80	5.25	5.70	6.15	6.60	7.05	7.50
50	3.35	3.80	4.25	4.70	5.15	5.60	6.05	6.50	6.95	7.40
55	3.30	3.75	4.20	4.65	5.10	5.55	6.00	6.45	6.90	7.35
60	3.35	3.80	4.25	4.70	5.15	5.60	6.05	6.50	6.95	7.40
65	3.40	3.85	4.30	4.75	5.20	5.65	6.10	6.55	7.00	7.45
70	3.50	3.95	4.40	4.85	5.30	5.75	6.20	6.65	7.10	7.55
75	3.60	4.05	4.50	4.95	5.40	5.85	6.30	6.75	7.20	7.65
80	3.70	4.15	4.60	5.05	5.50	5.95	6.40	6.85	7.30	7.75

1/ IN THOSE CASES WHERE VOLUMES EXCEED THOSE LISTED, USE THE COST OF THE LARGEST LOG VOLUME FOR THE APPLICABLE YARDING DISTANCE.

2/ DISTANCE LOGS ACTUALLY TRAVEL FROM CHOKER SETTING POINT TO THE LANDING.

3/ FOR DISTANCES EXCEEDING 1,000', ADD \$0.45 FOR EACH ADDITIONAL 100' OF YARDING DISTANCE.

BASIC DATA, APPENDIX I, PAGES 100 THRU 103, 251 & 252



9333.3 - PRODUCTION COSTS

(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 4

TRACTOR YARDING WESTERN OREGON		COSTS IN DOLLARS PER MBF GROSS VOLUME YARDED 1/									
16 FT. LOG VOLUME SCRIB. DEC.C.		YARDING DISTANCE IN FEET 2/ 3/									
		100	200	300	400	500	600	700	800	900	1000
8		21.45	21.80	22.15	22.50	22.85	23.20	23.55	23.90	24.25	24.60
10		17.75	18.10	18.45	18.80	19.15	19.50	19.85	20.20	20.55	20.90
12		14.75	15.10	15.45	15.80	16.15	16.50	16.85	17.20	17.55	17.90
14		12.30	12.65	13.00	13.35	13.70	14.05	14.40	14.75	15.05	15.40
16		10.25	10.60	10.95	11.30	11.65	12.00	12.35	12.70	13.05	13.40
18		8.65	9.00	9.35	9.70	10.05	10.40	10.75	11.10	11.45	11.80
20		7.30	7.65	8.00	8.35	8.70	9.05	9.40	9.75	10.10	10.45
22		6.20	6.55	6.90	7.25	7.60	7.95	8.30	8.65	9.00	9.35
24		5.35	5.70	6.05	6.40	6.75	7.10	7.45	7.80	8.15	8.50
26		4.65	4.95	5.30	5.65	6.00	6.35	6.70	7.05	7.40	7.75
28		4.05	4.40	4.75	5.10	5.45	5.80	6.15	6.50	6.85	7.20
30		3.60	3.95	4.30	4.65	5.00	5.35	5.70	6.05	6.40	6.75
35		2.80	3.15	3.50	3.85	4.20	4.55	4.90	5.25	5.60	5.95
40		2.35	2.70	3.05	3.40	3.75	4.10	4.45	4.80	5.15	5.50
45		2.15	2.50	2.85	3.15	3.50	3.85	4.20	4.55	4.90	5.25
50		2.05	2.40	2.75	3.10	3.45	3.80	4.15	4.50	4.80	5.15
55		2.00	2.35	2.70	3.05	3.40	3.75	4.10	4.45	4.80	5.15
60		2.05	2.40	2.75	3.10	3.45	3.80	4.15	4.50	4.85	5.20
65		2.10	2.45	2.80	3.15	3.50	3.85	4.20	4.55	4.90	5.25
70		2.20	2.55	2.90	3.25	3.60	3.95	4.30	4.65	5.00	5.35
75		2.30	2.65	3.00	3.35	3.70	4.00	4.35	4.70	5.05	5.40
80		2.40	2.75	3.05	3.40	3.75	4.10	4.45	4.80	5.15	5.50

1/ IN THOSE CASES WHERE VOLUMES EXCEED THOSE LISTED, USE THE COST OF THE LARGEST LOG VOLUME FOR THE APPLICABLE YARDING DISTANCE.  
2/ DISTANCE LOGS ACTUALLY TRAVEL FROM CHOKER SETTING POINT TO THE LANDING.  
3/ FOR DISTANCES EXCEEDING 1,000', ADD \$0.35 FOR EACH ADDITIONAL 100' OF YARDING DISTANCE.

BASIC DATA, APPENDIX I, PAGES 100 & 101, 251 & 252

9333.3 - PRODUCTION COSTS

(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 5

LOADING - TRACTOR OPERATIONS  
WESTERN OREGON  
COSTS IN DOLLARS PER MBF GROSS VOLUME LOADED 1/

16 FT. LOG VOLUME SCRIB. DEC.C.	YARDING DISTANCE IN FEET 2/ 3/							
	100	200	300	400	500	600	700	800
8	6.25	6.35	6.45	6.60	6.70	6.80	6.90	7.00
10	5.20	5.30	5.40	5.50	5.60	5.70	5.80	5.90
12	4.30	4.40	4.50	4.60	4.70	4.80	4.90	5.00
14	3.60	3.70	3.80	3.90	4.00	4.10	4.20	4.30
16	3.00	3.10	3.20	3.30	3.40	3.50	3.60	3.70
18	2.50	2.60	2.75	2.85	2.95	3.05	3.15	3.25
20	2.15	2.25	2.35	2.45	2.55	2.65	2.75	2.85
22	1.80	1.90	2.00	2.10	2.20	2.35	2.45	2.55
24	1.55	1.65	1.75	1.85	1.95	2.05	2.15	2.25
26	1.30	1.45	1.55	1.65	1.75	1.85	1.95	2.05
28	1.30	1.30	1.30	1.50	1.60	1.70	1.80	1.90
30	1.30	1.30	1.30	1.30	1.45	1.55	1.65	1.75
35	1.30	1.30	1.30	1.30	1.30	1.30	1.45	1.55
40	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.40
45	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
50	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
55	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
60	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
65	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
70	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
75	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
80	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30
900								
1000								

1/ IN THOSE CASES WHERE VOLUMES EXCEED THOSE LISTED, USE THE COST OF THE LARGEST LOG VOLUME FOR THE APPLICABLE YARDING DISTANCE.  
2/ DISTANCE LOGS ACTUALLY TRAVEL FROM CHOKER SETTING POINT TO THE LANDING.  
3/ FOR DISTANCES EXCEEDING 1,000', ADD \$0.15 FOR EACH ADDITIONAL 100' OF YARDING DISTANCE.

BASIC DATA, APPENDIX I, PAGES 102 & 103, 251 and 252.



9333.3 - PRODUCTION COSTS

(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 6A

YARDING AND LOADING - PARTIAL CUT TRACTOR OPERATIONS  
WESTERN OREGON

COSTS IN DOLLARS PER MBF GROSS VOLUME YARDED AND LOADED 1/ 2/

16 FT. LOG VOLUME SCRIB. DEC.C.	YARDING DISTANCE IN FEET 3/ 4/									
	100	200	300	400	500	600	700	800	900	1000
8	41.10	41.95	42.80	43.60	44.45	45.30	46.15	47.00	47.85	48.70
10	35.25	36.10	36.90	37.75	38.60	39.45	40.30	41.15	42.00	42.85
12	30.40	31.25	32.10	32.95	33.80	34.60	35.45	36.30	37.15	38.00
14	26.40	27.25	28.10	28.95	29.80	30.60	31.45	32.30	33.15	34.00
16	23.18	23.95	24.75	25.60	26.45	27.30	28.15	29.00	29.85	30.70
18	20.35	21.20	22.00	22.85	23.70	24.55	25.40	26.25	27.10	27.95
20	18.05	18.90	19.70	20.55	21.40	22.25	23.10	23.95	24.80	25.65
22	16.10	16.95	17.80	18.65	19.50	20.35	21.20	22.05	22.85	23.70
24	14.50	15.35	16.20	17.05	17.90	18.70	19.55	20.40	21.25	22.10
26	13.15	14.00	14.85	15.65	16.50	17.35	18.20	19.05	19.90	20.75
28	12.00	12.85	13.65	14.50	15.35	16.20	17.05	17.90	18.75	19.60
30	11.20	11.85	12.70	13.55	14.35	15.20	16.05	16.90	17.75	18.60
35	9.75	10.40	11.05	11.70	12.45	13.30	14.15	15.00	15.85	16.70
40	8.65	9.30	9.95	10.60	11.30	11.95	12.75	13.60	14.45	15.30
45	7.85	8.50	9.15	9.80	10.45	11.10	11.75	12.55	13.40	14.25
50	7.15	7.85	8.50	9.15	9.80	10.45	11.10	11.75	12.50	13.35
55	6.60	7.25	7.90	8.55	9.20	9.85	10.50	11.15	11.80	12.60
60	6.05	6.75	7.40	8.05	8.70	9.35	10.00	10.65	11.30	11.95
65	5.60	6.25	6.90	7.55	8.20	8.85	9.50	10.15	10.80	11.45
70	5.10	5.75	6.45	7.10	7.75	8.40	9.05	9.70	10.35	11.00
75	4.65	5.30	5.95	6.60	7.30	7.95	8.60	9.25	9.90	10.55
80	4.20	4.85	5.50	6.20	6.85	7.50	8.15	8.80	9.45	10.10

1/ IN THOSE CASES WHERE VOLUMES EXCEED THOSE LISTED, USE THE COST OF THE LARGEST LOG VOLUME FOR THE APPLICABLE YARDING DISTANCE.  
2/ THE COST PER MBF GROSS VOLUME FROM THE TWO TABLES MUST BE COMBINED BEFORE THE WEIGHTED PARTIAL CUT TRACTOR YARDING COST CALCULATION IS MADE. SPECIAL NOTE MUST BE MADE OF THE ALGEBRAIC SIGN WHICH APPEARS IN THE SECOND TABLE.  
3/ YARDING DISTANCE IS THE AVERAGE STRAIGHT LINE SLOPE DISTANCE FROM CHOKER SETTING POINT TO THE LANDING.  
DO NOT ADD A FACTOR FOR WEAVE.  
4/ FOR DISTANCES EXCEEDING 1,000', ADD \$0.85 FOR EACH ADDITIONAL 180' OF YARDING DISTANCE.

9333.3 - PRODUCTION COSTS

(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 6B

YARDING AND LOADING - PARTIAL CUT TRACTOR OPERATIONS  
WESTERN OREGON

COSTS IN DOLLARS PER MBF GROSS VOLUME YARDED AND LOADED 2/

NUMBER OF MERCHANTABLE STEMS MARKED PER ACRE 5/

PER CENT SLOPE 6/	5	6	7	8	9	10	11	12	13	14	15	16	17	18
0	-1.20	-1.45	-1.70	-1.90	-2.15	-2.40	-2.65	-2.90	-3.10	-3.35	-3.60	-3.85	-4.10	-4.30
5	-.55	-.75	-1.00	-1.25	-1.50	-1.75	-1.95	-2.20	-2.45	-2.70	-2.95	-3.15	-3.40	-3.65
10	.15	-.10	-.35	-.55	-.80	-1.05	-1.30	-1.55	-1.75	-2.00	-2.25	-2.50	-2.75	-2.95
15	.85	.60	.35	.10	-.15	-.40	-.60	-.85	-1.10	-1.35	-1.60	-1.80	-2.05	-2.30
20	1.50	1.25	1.00	.80	.55	.30	.05	-.20	-.40	-.65	-.90	-1.15	-1.40	-1.60
25	2.20	1.95	1.70	1.45	1.20	1.00	.75	.50	.25	0.00	-.25	-.45	-.70	-.95
30	2.85	2.60	2.35	2.15	1.90	1.65	1.40	1.15	.95	.70	.45	.20	-.05	-.25
35	3.55	3.30	3.05	2.80	2.55	2.35	2.10	1.85	1.60	1.35	1.15	.90	.65	.40
40	4.20	3.95	3.70	3.50	3.25	3.00	2.75	2.50	2.30	2.05	1.80	1.55	1.30	1.10
45	4.90	4.65	4.40	4.15	3.90	3.70	3.45	3.20	2.95	2.70	2.50	2.25	2.00	1.75
50	5.55	5.30	5.05	4.85	4.60	4.35	4.10	3.85	3.65	3.40	3.15	2.90	2.65	2.45
55	6.25	6.00	5.75	5.50	5.25	5.05	4.80	4.55	4.30	4.05	3.85	3.60	3.35	3.10
60	6.90	6.65	6.40	6.20	5.95	5.70	5.45	5.20	5.00	4.75	4.50	4.25	4.00	3.80

5/ MARKED STEMS - THIS IS THE NUMBER OF MERCHANTABLE STEMS MARKED PER ACRE WITHIN THE YARDING AREA.  
6/ SLOPE - THIS IS THE AVERAGE SLOPE IN PER CENT OF THE AREA BEING LOGGED AS ESTIMATED BY THE CRUISER.

BASIC DATA, APPENDIX I, PAGES 180 THRU 183, AND 253. and 253A.



9333.3 - PRODUCTION COSTS

(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 7A

PARTIAL CUT YARDING - TRACTOR OPERATIONS WESTERN OREGON *										
COSTS IN DOLLARS PER MBF GROSS VOLUME YARDED 1 / 2 /										
16 FT. LOG VOLUME SCRIB. DEC.C.	YARDING DISTANCE IN FEET 3 / 4 /									
	100	200	300	400	500	600	700	800	900	1000
8	31.80	32.45	33.10	33.75	34.40	35.05	35.70	36.35	37.05	37.70
10	27.25	27.90	28.55	29.25	29.90	30.55	31.20	31.85	32.50	33.15
12	23.55	24.20	24.85	25.50	26.15	26.80	27.45	28.10	28.75	29.40
14	20.45	21.10	21.75	22.40	23.05	23.70	24.35	25.00	25.65	26.30
16	17.85	18.50	19.15	19.85	20.50	21.15	21.80	22.45	23.10	23.75
18	15.75	16.40	17.05	17.70	18.35	19.00	19.65	20.30	20.95	21.60
20	13.95	14.60	15.25	15.90	16.55	17.25	17.90	18.55	19.20	19.85
22	12.45	13.10	13.80	14.45	15.10	15.75	16.40	17.05	17.70	18.35
24	11.20	11.90	12.55	13.20	13.85	14.50	15.15	15.80	16.45	17.10
26	10.15	10.80	11.50	12.15	12.80	13.45	14.10	14.75	15.40	16.05
28	9.25	9.95	10.60	11.25	11.90	12.55	13.20	13.85	14.50	15.15
30	8.50	9.15	9.80	10.45	11.10	11.80	12.45	13.10	13.75	14.40
35	7.05	7.70	8.35	9.00	9.65	10.30	10.95	11.60	12.25	12.90
40	5.95	6.60	7.25	7.90	8.55	9.20	9.90	10.55	11.20	11.85
45	5.15	5.80	6.45	7.10	7.75	8.40	9.05	9.70	10.35	11.00
50	4.45	5.10	5.75	6.40	7.10	7.75	8.40	9.05	9.70	10.35
55	3.90	4.55	5.20	5.85	6.50	7.15	7.80	8.45	9.10	9.75
60	3.35	4.00	4.65	5.35	6.00	6.65	7.30	7.95	8.60	9.25
65	2.90	3.55	4.20	4.85	5.50	6.15	6.80	7.45	8.10	8.75
70	2.40	3.05	3.70	4.35	5.00	5.70	6.35	7.00	7.65	8.30
75	1.95	2.60	3.25	3.90	4.55	5.20	5.90	6.55	7.20	7.85
80	1.50	2.15	2.80	3.45	4.10	4.80	5.45	6.10	6.75	7.40

1/ IN THOSE CASES WHERE VOLUMES EXCEED THOSE LISTED, USE THE COST OF THE LARGEST LOG VOLUME FOR THE APPLICABLE YARDING DISTANCE.

2/ THE COST PER MBF GROSS VOLUME FROM THE TWO TABLES MUST BE COMBINED BEFORE THE WEIGHTED PARTIAL CUT TRACTOR YARDING COST CALCULATION IS MADE. SPECIAL NOTE MUST BE MADE OF THE ALGEBRAIC SIGN WHICH APPEARS IN THE SECOND TABLE.

3/ YARDING DISTANCE IS THE AVERAGE STRAIGHT LINE SLOPE DISTANCE FROM CHOKER SETTING POINT TO THE LANDING. DO NOT ADD A FACTOR FOR WEAVE.

4/ FOR DISTANCES EXCEEDING 1,000', ADD \$0.65 FOR EACH ADDITIONAL 100' OF YARDING DISTANCE.

\* SALVAGE PICKUP - TABULAR COSTS, INCLUDING PLUS AND MINUS FIGURES IN TABLE 8B, BY FACTOR OF 0.903. FOR DISTANCES EXCEEDING 1000', ADD \$0.60 FOR EACH ADDITIONAL 100' OF YARDING DISTANCES.

9333.3 - PRODUCTION COSTS

(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 7B

PARTIAL CUT YARDING - TRACTOR OPERATIONS  
WESTERN OREGON

COSTS IN DOLLARS PER MBF GROSS VOLUME YARDED 2/

NUMBER OF MERCHANTABLE STEMS MARKED PER ACRE 5/

PER CENT SLOPE 6/	5	6	7	8	9	10	11	12	13	14	15	16	17	18
0	-.95	-1.10	-1.30	-1.50	-1.65	-1.85	-2.05	-2.25	-2.40	-2.60	-2.80	-2.95	-3.15	-3.35
5	-.40	-.60	-.80	-.95	-1.15	-1.35	-1.50	-1.70	-1.90	-2.10	-2.25	-2.45	-2.65	-2.80
10	.10	-.05	-.25	-.45	-.65	-.80	-1.00	-1.20	-1.35	-1.55	-1.75	-1.95	-2.10	-2.30
15	.65	.45	.25	.10	-.10	-.30	-.50	-.65	-.85	-1.05	-1.20	-1.40	-1.60	-1.80
20	1.15	1.00	.80	.60	.40	.25	.05	-.15	-.35	-.50	-.70	-.90	-1.05	-1.25
25	1.70	1.50	1.30	1.15	.95	.75	.55	.40	.20	0.00	-.15	-.35	-.55	-.75
30	2.20	2.00	1.85	1.65	1.45	1.30	1.10	.90	.70	.55	.35	.15	0.00	-.20
35	2.75	2.55	2.35	2.15	2.00	1.80	1.60	1.45	1.25	1.05	.85	.70	.50	.30
40	3.25	3.05	2.90	2.70	2.50	2.30	2.15	1.95	1.75	1.60	1.40	1.20	1.00	.85
45	3.75	3.60	3.40	3.20	3.05	2.85	2.65	2.45	2.30	2.10	1.90	1.75	1.55	1.35
50	4.30	4.10	3.90	3.75	3.55	3.35	3.20	3.00	2.80	2.60	2.45	2.25	2.05	1.90
55	4.80	4.65	4.45	4.25	4.10	3.90	3.70	3.50	3.35	3.15	2.95	2.75	2.60	2.40
60	5.35	5.15	4.95	4.80	4.60	4.40	4.25	4.05	3.85	3.65	3.50	3.30	3.10	2.95

5/ MARKED STEMS - THIS IS THE NUMBER OF MERCHANTABLE STEMS MARKED PER ACRE WITHIN THE YARDING AREA.  
6/ SLOPE - THIS IS THE AVERAGE SLOPE IN PER CENT OF THE AREA BEING LOGGED AS ESTIMATED BY THE CRUISER.

BASIC DATA, APPENDIX 1, PAGES 100, 161, 104 THRU 107, AND 253, 253A.



(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 8A

LOADING - PARTIAL CUT TRACTOR OPERATIONS  
WESTERN OREGON \*  
COSTS IN DOLLARS PER MBF GROSS VOLUME LOADED 1/ 2/

16 FT. LOG VOLUME SCRIB. DEC.C.	100	200	300	400	500	600	700	800	900	1000
8	9.30	9.50	9.65	9.85	10.05	10.25	10.45	10.65	10.80	11.00
10	7.95	8.15	8.35	8.55	8.75	8.90	9.10	9.30	9.50	9.70
12	6.85	7.05	7.25	7.45	7.65	7.85	8.00	8.20	8.40	8.60
14	5.95	6.15	6.35	6.55	6.75	6.90	7.10	7.30	7.50	7.70
16	5.20	5.40	5.60	5.80	6.00	6.15	6.35	6.55	6.75	6.95
18	4.60	4.80	5.00	5.15	5.35	5.55	5.75	5.95	6.10	6.30
20	4.10	4.25	4.45	4.65	4.85	5.05	5.20	5.40	5.60	5.80
22	3.65	3.85	4.05	4.20	4.40	4.60	4.80	5.00	5.15	5.35
24	3.30	3.45	3.65	3.85	4.05	4.25	4.40	4.60	4.80	5.00
26	2.95	3.15	3.35	3.55	3.75	3.95	4.10	4.30	4.50	4.70
28	2.70	2.90	3.10	3.30	3.45	3.65	3.85	4.05	4.25	4.45
30	2.70	2.70	2.85	3.05	3.25	3.45	3.65	3.80	4.00	4.20
35	2.70	2.70	2.70	2.70	2.80	3.00	3.20	3.40	3.60	3.75
40	2.70	2.70	2.70	2.70	2.70	2.70	2.90	3.10	3.25	3.45
45	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.85	3.05	3.20
50	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.85	3.00
55	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.85
60	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
65	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
75	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
80	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70

1/ IN THOSE CASES WHERE VOLUMES EXCEED THOSE LISTED, USE THE COST OF THE LARGEST LOG VOLUME FOR THE APPLICABLE YARDING DISTANCE.

2/ THE COST PER MBF GROSS VOLUME FROM THE TWO TABLES MUST BE COMBINED BEFORE THE WEIGHTED PARTIAL CUT TRACTOR YARDING COST CALCULATION IS MADE. SPECIAL NOTE MUST BE MADE OF THE ALGEBRAIC SIGN WHICH APPEARS IN THE SECOND TABLE.

3/ YARDING DISTANCE IS THE AVERAGE STRAIGHT LINE SLOPE DISTANCE FROM CHOKER SETTING POINT TO THE LANDING. DO NOT ADD A FACTOR FOR WEAVE.

4/ FOR DISTANCES EXCEEDING 1,000', ADD \$0.20 FOR EACH ADDITIONAL 100' OF YARDING DISTANCE.

\* SALVAGE PICKUP - TABULAR COSTS, INCLUDING PLUS AND MINUS FIGURES IN TABLE 8B, BY FACTOR OF 0.855. FOR DISTANCES EXCEEDING 1000', ADD \$0.15 FOR EACH ADDITIONAL 100' OF YARDING DISTANCES.

9333.3 - PRODUCTION COSTS

(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 8B

LOADING - PARTIAL CUT TRACTOR OPERATIONS  
WESTERN OREGON

COSTS IN DOLLARS PER MBF GROSS VOLUME LOADED 2/

NUMBER OF MERCHANTABLE STEMS MARKED PER ACRE 5/

PER CENT SLOPE 6/	5	6	7	8	9	10	11	12	13	14	15	16	17	18
0	-.25	-.35	-.40	-.45	-.50	-.55	-.60	-.65	-.70	-.75	-.80	-.85	-.90	-1.00
5	-.10	-.15	-.25	-.30	-.35	-.40	-.45	-.50	-.55	-.60	-.65	-.70	-.75	-.80
10	.05	0.00	-.05	-.15	-.20	-.25	-.30	-.35	-.40	-.45	-.50	-.55	-.60	-.65
15	.20	.15	.10	0.00	-.05	-.10	-.15	-.20	-.25	-.30	-.35	-.40	-.45	-.50
20	.35	.30	.25	.20	.10	.05	0.00	-.05	-.10	-.15	-.20	-.25	-.30	-.35
25	.50	.45	.40	.35	.25	.20	.15	.10	.05	0.00	-.05	-.10	-.15	-.20
30	.65	.60	.55	.50	.45	.35	.30	.25	.20	.15	.10	.05	0.00	-.05
35	.80	.75	.70	.65	.60	.55	.45	.40	.35	.30	.25	.20	.15	.10
40	.95	.90	.85	.80	.75	.70	.60	.55	.50	.45	.40	.35	.30	.25
45	1.10	1.05	1.00	.95	.90	.85	.80	.70	.65	.60	.55	.50	.45	.40
50	1.25	1.20	1.15	1.10	1.05	1.00	.95	.90	.80	.75	.70	.65	.60	.55
55	1.40	1.35	1.30	1.25	1.20	1.15	1.10	1.05	.95	.90	.85	.80	.75	.70
60	1.55	1.50	1.45	1.40	1.35	1.30	1.25	1.20	1.15	1.05	1.00	.95	.90	.85

5/ MARKED STEMS - THIS IS THE NUMBER OF MERCHANTABLE STEMS MARKED PER ACRE WITHIN THE YARDING AREA.  
6/ SLOPE - THIS IS THE AVERAGE SLOPE IN PER CENT OF THE AREA BEING LOGGED AS ESTIMATED BY THE CRUISER.

BASIC DATA, APPENDIX 1, PAGES 102 THRU 107, 253 and 253A.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 9

TRACTOR RIGGING - WESTERN OREGON

CLEAR CUT AND PARTIAL CUT

Includes: 2 yarding tractors  
Large mobile log loader  
5 man yarding crew  
2 man yarding crew

First Landing \$225

1/ Additional Landings 75 (each)

WESTERN OREGON - FOR SALVAGE PICKUP

Includes: 1 yarding tractor  
1 front end loader  
3 man yarding and loading crew

First Landing \$195

1/ Additional Landings 75(each)

1/ If landings are more than 1/2 mile apart, allow \$30 for each additional 1/4 mile.

Move in costs not included. See Table 1 for appropriate move in costs. These rigging costs are suggested as guidelines. The appraiser should judge each logging situation individually and develop appropriate rigging costs.

Basic Data, Appendix 1, Pages 108 thru 115

9333.3 - PRODUCTION COSTS

(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 10

YARDING AND LOADING - TRACTOR OPERATIONS  
EASTERN OREGON  
COSTS IN DOLLARS PER MBF GROSS VOLUME YARDED AND LOADED 1/

16 FT. LOG VOLUME SCRIB. DEC.C.	100	200	300	400	500	600	700	800	900	1000
4	19.10	19.55	19.95	20.41	20.80	21.25	21.70	22.10	22.55	22.95
6	18.10	18.55	19.00	19.40	19.85	20.30	20.70	21.15	21.55	22.00
8	17.15	17.60	18.05	18.45	18.90	19.31	19.75	20.20	20.60	21.15
10	16.25	16.65	17.10	17.55	17.95	18.40	18.85	19.25	19.70	20.10
12	15.35	15.75	16.20	16.65	17.05	17.50	17.90	18.35	18.80	19.20
14	14.45	14.90	15.30	15.75	16.20	16.60	17.05	17.45	17.90	18.35
16	13.60	14.05	14.45	14.90	15.35	15.75	16.20	16.60	17.05	17.50
18	12.75	13.20	13.65	14.05	14.50	14.95	15.35	15.80	16.20	16.65
20	11.95	12.40	12.85	13.25	13.70	14.10	14.55	15.00	15.40	15.85
22	11.20	11.60	12.05	12.45	12.90	13.35	13.75	14.20	14.65	15.05
24	10.40	10.85	11.30	11.70	12.15	12.60	13.00	13.45	13.85	14.30
26	9.70	10.10	10.55	11.00	11.40	11.85	12.25	12.70	13.15	13.55
28	9.00	9.40	9.85	10.25	10.70	11.15	11.55	12.00	12.45	12.85
30	8.30	8.75	9.15	9.60	10.00	10.45	10.90	11.30	11.75	12.15
32	7.65	8.05	8.50	8.95	9.35	9.80	10.20	10.65	11.10	11.50
34	7.00	7.45	7.85	8.30	8.70	9.15	9.60	10.00	10.45	10.85
36	6.40	6.80	7.25	7.70	8.10	8.55	8.95	9.40	9.85	10.25
38	5.80	6.25	6.65	7.10	7.50	7.95	8.40	8.80	9.25	9.65
40	5.25	5.65	6.10	6.55	6.95	7.40	7.80	8.25	8.70	9.10
42	4.70	5.10	5.55	6.00	6.40	6.85	7.30	7.70	8.15	8.55

1/ IN THOSE CASES WHERE VOLUMES EXCEED THOSE LISTED, USE THE COST OF THE LARGEST LOG VOLUME FOR THE APPLICABLE YARDING DISTANCE.  
2/ DISTANCE LOGS ACTUALLY TRAVEL FROM CHOKER SETTING POINT TO THE LANDING.  
3/ FOR DISTANCES EXCEEDING 1,000', ADD \$0.45 FOR EACH ADDITIONAL 100' OF YARDING DISTANCE.

BASIC DATA, APPENDIX I, PAGES 116-119, 254



9333.3 - PRODUCTION COSTS

(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 11

TRACTOR YARDING  
EASTERN OREGON  
COSTS IN DOLLARS PER MBF GROSS VOLUME YARDED 1/  
YARDING DISTANCE IN FEET 2/ 3/

16 FT. LOG VOLUME SCRIB. DEC.C.	100	200	300	400	500	600	700	800	900	1000
4	13.20	13.50	13.80	14.10	14.40	14.70	15.00	15.30	15.60	15.90
6	12.55	12.85	13.15	13.45	13.70	14.00	14.30	14.60	14.90	15.20
8	11.85	12.15	12.45	12.75	13.05	13.35	13.65	13.95	14.25	14.55
10	11.25	11.55	11.85	12.10	12.40	12.70	13.00	13.30	13.60	13.90
12	10.60	10.90	11.20	11.50	11.80	12.10	12.40	12.70	13.00	13.30
14	10.00	10.30	10.60	10.90	11.20	11.50	11.80	12.10	12.40	12.70
16	9.40	9.70	10.00	10.30	10.60	10.90	11.20	11.50	11.80	12.10
18	8.85	9.15	9.45	9.75	10.00	10.30	10.60	10.90	11.20	11.50
20	8.25	8.55	8.85	9.15	9.45	9.75	10.05	10.35	10.65	10.95
22	7.75	8.05	8.35	8.65	8.90	9.20	9.50	9.80	10.10	10.40
24	7.20	7.50	7.80	8.10	8.40	8.70	9.00	9.30	9.60	9.90
26	6.70	7.00	7.30	7.60	7.90	8.20	8.50	8.80	9.10	9.40
28	6.20	6.50	6.80	7.10	7.40	7.70	8.00	8.30	8.60	8.90
30	5.75	6.05	6.35	6.65	6.95	7.25	7.50	7.80	8.10	8.40
32	5.30	5.60	5.90	6.15	6.45	6.75	7.05	7.35	7.65	7.95
34	4.85	5.15	5.45	5.75	6.05	6.35	6.65	6.90	7.20	7.50
36	4.40	4.70	5.00	5.30	5.60	5.90	6.20	6.50	6.80	7.10
38	4.00	4.30	4.60	4.90	5.20	5.50	5.80	6.10	6.40	6.70
40	3.60	3.90	4.20	4.50	4.80	5.10	5.40	5.70	6.00	6.30
42	3.25	3.55	3.85	4.15	4.45	4.75	5.05	5.35	5.65	5.95

1/ IN THOSE CASES WHERE VOLUMES EXCEED THOSE LISTED, USE THE COST OF THE LARGEST LOG VOLUME FOR THE APPLICABLE YARDING DISTANCE.

2/ DISTANCE LOGS ACTUALLY TRAVEL FROM CHOKER SETTING POINT TO THE LANDING.

3/ FOR DISTANCES EXCEEDING 1,000', ADD \$0.30 FOR EACH ADDITIONAL 100' OF YARDING DISTANCE.

BASIC DATA, APPENDIX I, PAGES 116, 117, 254.

9333.3 - PRODUCTION COSTS

(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 12

LOADING - TRACTOR OPERATIONS  
EASTERN OREGON  
COSTS IN DOLLARS PER M3F GROSS VOLUME LOADED 1/ 2/

16 FT. LOG VOLUME SCRIB. DEC.G.	YARDING DISTANCE IN FEET 3/ 4/							
	100	200	300	400	500	600	700	800
4	5.90	6.00	6.15	6.30	6.40	6.55	6.70	6.80
6	5.60	5.70	5.85	6.00	6.10	6.25	6.40	6.50
8	5.30	5.45	5.55	5.70	5.85	5.95	6.10	6.25
10	5.00	5.15	5.30	5.40	5.55	5.65	5.80	5.95
12	4.75	4.85	5.00	5.15	5.25	5.40	5.55	5.65
14	4.45	4.60	4.75	4.85	5.00	5.10	5.25	5.40
16	4.20	4.35	4.45	4.60	4.75	4.85	5.00	5.15
18	3.95	4.05	4.20	4.35	4.45	4.60	4.75	4.85
20	3.70	3.80	3.95	4.10	4.20	4.35	4.50	4.60
22	3.45	3.60	3.70	3.85	4.00	4.10	4.25	4.40
24	3.20	3.35	3.50	3.60	3.75	3.90	4.00	4.15
26	3.00	3.10	3.25	3.40	3.50	3.65	3.80	3.90
28	2.75	2.90	3.05	3.15	3.30	3.45	3.55	3.70
30	2.55	2.70	2.80	2.95	3.10	3.20	3.35	3.50
32	2.35	2.50	2.60	2.75	2.90	3.00	3.15	3.30
34	2.15	2.30	2.40	2.55	2.70	2.80	2.95	3.10
36	1.95	2.10	2.25	2.35	2.50	2.65	2.75	2.90
38	1.80	1.90	2.05	2.20	2.30	2.45	2.60	2.70
40	1.60	1.75	1.90	2.00	2.15	2.30	2.40	2.55
42	1.45	1.60	1.70	1.85	2.00	2.10	2.25	2.40

1/ THESE COSTS APPLY WHERE LOADING PRODUCTION IS LIMITED BY YARDING PRODUCTION.  
2/ IN THOSE CASES WHERE VOLUMES EXCEED THOSE LISTED, USE THE COST OF THE LARGEST LOG VOLUME FOR THE APPLICABLE YARDING DISTANCE.  
3/ DISTANCE LOGS ACTUALLY TRAVEL FROM CHOKER SETTING POINT TO THE LANDING.  
4/ FOR DISTANCES EXCEEDING 1,000', ADD \$0.15 FOR EACH ADDITIONAL 100' OF YARDING DISTANCE.

BASIC DATA, APPENDIX I, PAGES 118, 119, 254.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 13

TRACTOR RIGGING - EASTERN OREGON

Includes: 2 yarding tractors  
Large mobile log loader  
5 man yarding crew  
2 man yarding crew

First Landing \$245

1/ Additional Landings 60 (each)

1/ If landings are more than 1/2 mile apart, allow \$32  
for each additional 1/4 mile.

Move in costs not included. See Table 2 for appropriate move in costs. These rigging costs are suggested as guidelines. The appraiser should judge each logging situation individually and develop appropriate rigging cost.

Basic Data, Appendix 1, Pages 120 thru 123

9333.3 - PRODUCTION COSTS

(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 14

YARDING AND LOADING - HIGH-LEAD OPERATIONS  
WESTERN OREGON

COSTS IN DOLLARS PER MBF GROSS VOLUME YARDED AND LOADED 1/ 2/

16 FT. LOG VOLUME SCRIB. DEC.C.	100	200	300	400	500	600	700	800	900	1000
8	36.35	37.60	38.85	40.10	41.35	42.60	43.85	45.10	46.35	47.55
10	27.25	28.50	29.70	30.95	32.20	33.45	34.70	35.95	37.20	38.45
12	21.10	22.35	23.60	24.85	26.10	27.35	28.55	29.80	31.05	32.30
14	17.00	18.25	19.50	20.70	21.95	23.20	24.45	25.70	26.95	28.20
16	14.20	15.45	16.70	17.95	19.20	20.45	21.70	22.95	24.20	25.40
18	12.35	13.60	14.85	16.10	17.35	18.60	19.85	21.05	22.30	23.55
20	11.10	12.35	13.60	14.85	16.10	17.35	18.55	19.80	21.05	22.30
22	10.25	11.50	12.75	14.00	15.25	16.50	17.75	18.95	20.20	21.45
24	9.70	10.95	12.20	13.40	14.65	15.90	17.15	18.40	19.65	20.90
26	9.30	10.55	11.80	13.05	14.30	15.50	16.75	18.00	19.25	20.50
28	9.05	10.30	11.50	12.75	14.00	15.25	16.50	17.75	19.00	20.25
30	8.85	10.10	11.35	12.60	13.80	15.05	16.30	17.55	18.80	20.05
35	8.60	9.85	11.05	12.30	13.55	14.80	16.05	17.30	18.55	19.80
40	8.45	9.70	10.95	12.20	13.45	14.70	15.90	17.15	18.40	19.65
45	8.40	9.60	10.85	12.10	13.35	14.60	15.85	17.10	18.35	19.55
50	8.30	9.55	10.80	12.05	13.30	14.55	15.80	17.05	18.25	19.50
55	8.25	9.50	10.75	12.00	13.25	14.50	15.75	17.00	18.20	19.45
60	8.20	9.45	10.70	11.95	13.20	14.45	15.70	16.95	18.15	19.40
65	8.15	9.40	10.65	11.90	13.15	14.40	15.65	16.90	18.10	19.35
70	8.10	9.35	10.60	11.85	13.10	14.35	15.60	16.85	18.10	19.30
75	8.10	9.30	10.55	11.80	13.05	14.30	15.55	16.80	18.05	19.25
80	8.05	9.25	10.50	11.75	13.00	14.25	15.50	16.75	18.00	19.20

1/ IF VOLUME OF AVERAGE LOG DOES NOT FALL ON VOLUMES LISTED, USE COST OF THE NEXT LOWER LOG VOLUME.  
2/ IN THOSE CASES WHERE VOLUMES EXCEED THOSE LISTED, USE THE COST OF THE LARGEST LOG VOLUME FOR THE APPLICABLE YARDING DISTANCE.

3/ CORRECTION FOR SLOPE - UPHILL YARDING - SUBTRACT \$0.26 FOR EACH 10 PER CENT OF SLOPE FROM 0 PER CENT TO 60 PER CENT. USE THE VALUE FOR 60 PER CENT FOR SLOPES EXCEEDING 60 PER CENT. DOWNHILL YARDING - ADD \$0.26 FOR EACH 10 PER CENT OF SLOPE FROM 0 TO 30 PER CENT. USE THE VALUE FOR 30 PER CENT FOR SLOPES EXCEEDING 30 PER CENT.

4/ FOR DISTANCES EXCEEDING 1,000', ADD \$1.20 FOR EACH ADDITIONAL 100' OF YARDING DISTANCE.

BASIC DATA, APPENDIX I, PAGES 124, 125, 130, 131, 255 AND 256



9333.3 - PRODUCTION COSTS

(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 15

HIGH-LEAD YARDING WESTERN OREGON		COSTS IN DOLLARS PER MBF GROSS VOLUME YARDED 1/ 2/									
16 FT. LOG VOLUME SCRIB. DEC.C.		YARDING (SLOPE) DISTANCE IN FEET 3/ 4/									
		100	200	300	400	500	600	700	800	900	1000
8		27.45	28.40	29.35	30.25	31.20	32.15	33.10	34.00	34.95	35.90
10		20.55	21.50	22.45	23.35	24.30	25.25	26.20	27.15	28.05	29.00
12		15.95	16.85	17.80	18.75	19.70	20.60	21.55	22.50	23.45	24.40
14		12.80	13.75	14.70	15.65	16.60	17.50	18.45	19.40	20.35	21.25
16		10.75	11.65	12.60	13.55	14.50	15.45	16.35	17.30	18.25	19.20
18		9.35	10.25	11.20	12.15	13.10	14.05	14.95	15.90	16.85	17.80
20		8.40	9.30	10.25	11.20	12.15	13.10	14.00	14.95	15.90	16.85
22		7.75	8.70	9.60	10.55	11.50	12.45	13.40	14.30	15.25	16.20
24		7.30	8.25	9.20	10.15	11.05	12.00	12.95	13.90	14.80	15.75
26		7.00	7.95	8.90	9.85	10.75	11.70	12.65	13.60	14.55	15.45
28		6.80	7.75	8.70	9.65	10.55	11.50	12.45	13.40	14.35	15.25
30		6.70	7.60	8.55	9.50	10.45	11.35	12.30	13.25	14.20	15.15
35		6.50	7.40	8.35	9.30	10.25	11.15	12.10	13.05	14.00	14.95
40		6.40	7.30	8.25	9.20	10.15	11.10	12.00	12.95	13.90	14.85
45		6.30	7.25	8.20	9.15	10.10	11.00	11.95	12.90	13.85	14.75
50		6.30	7.20	8.15	9.10	10.05	10.95	11.90	12.85	13.80	14.75
55		6.25	7.20	8.10	9.05	10.00	10.95	11.85	12.80	13.75	14.70
60		6.20	7.15	8.10	9.00	9.95	10.90	11.85	12.80	13.70	14.65
65		6.15	7.10	8.05	9.00	9.90	10.85	11.80	12.75	13.70	14.60
70		6.15	7.05	8.00	8.95	9.90	10.85	11.75	12.70	13.65	14.60
75		6.10	7.05	7.95	8.90	9.85	10.80	11.75	12.65	13.60	14.55
80		6.05	7.00	7.95	8.90	9.80	10.75	11.70	12.65	13.55	14.50

1/ IF VOLUME OF AVERAGE LOG DOES NOT FALL ON VOLUMES LISTED, USE COST OF THE NEXT LOWER LOG VOLUME.  
 2/ IN THOSE CASES WHERE VOLUMES EXCEED THOSE LISTED, USE THE COST OF THE LARGEST LOG VOLUME FOR THE APPLICABLE YARDING DISTANCE.  
 3/ CORRECTION FOR SLOPE - UPHILL YARDING - SUBTRACT \$0.19 FOR EACH 10 PER CENT OF SLOPE FROM 0 PER CENT TO 60 PER CENT. USE THE VALUE FOR 60 PER CENT FOR SLOPES EXCEEDING 60 PER CENT. DOWNHILL YARDING - ADD \$0.19 FOR EACH 10 PER CENT OF SLOPE FROM 0 TO 30 PER CENT. USE THE VALUE FOR 30 PER CENT FOR SLOPES EXCEEDING 30 PER CENT.  
 4/ FOR DISTANCES EXCEEDING 1,000', ADD \$0.90 FOR EACH ADDITIONAL 100' OF YARDING DISTANCE.

BASIC DATA, APPENDIX I, PAGES 124, 125, 255 AND 256



9333.3 - PRODUCTION COSTS

(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 16

LOADING - HIGH-LEAD OPERATIONS WESTERN OREGON									
COSTS IN DOLLARS PER MBF GROSS VOLUME LOADED 1/ 2/ 3/									
16 FT. LOG VOLUME SCRIB. DEC-G.	YARDING (SLOPE) DISTANCE IN FEET 4/ 5/								
	100	200	300	400	500	600	700	800	1000
8	8.90	9.25	9.55	9.85	10.15	10.45	10.75	11.05	11.65
10	6.70	7.80	7.30	7.60	7.90	8.20	8.50	8.80	9.45
12	5.20	5.50	5.80	6.10	6.40	6.70	7.00	7.30	7.90
14	4.15	4.45	4.80	5.10	5.40	5.70	6.00	6.30	6.90
16	3.50	3.80	4.10	4.40	4.70	5.00	5.30	5.60	6.25
18	3.05	3.35	3.65	3.95	4.25	4.55	4.85	5.15	5.80
20	2.75	3.05	3.35	3.65	3.95	4.25	4.55	4.85	5.45
22	2.50	2.80	3.15	3.45	3.75	4.05	4.35	4.65	5.25
24	2.40	2.70	3.00	3.30	3.60	3.90	4.20	4.50	5.10
26	2.30	2.60	2.90	3.20	3.50	3.80	4.10	4.40	5.05
28	2.20	2.50	2.85	3.15	3.45	3.75	4.05	4.35	4.95
30	2.15	2.45	2.80	3.10	3.40	3.70	4.00	4.30	4.90
35	2.10	2.40	2.70	3.00	3.35	3.65	3.95	4.25	4.85
40	2.05	2.40	2.70	3.00	3.30	3.60	3.90	4.20	4.80
45	2.05	2.35	2.65	2.95	3.30	3.60	3.90	4.20	4.80
50	2.05	2.35	2.65	2.95	3.25	3.55	3.85	4.20	4.80
55	2.05	2.35	2.65	2.95	3.25	3.55	3.85	4.15	4.75
60	2.00	2.30	2.65	2.95	3.25	3.55	3.85	4.15	4.75
65	2.00	2.30	2.60	2.90	3.20	3.50	3.80	4.15	4.75
70	2.00	2.30	2.60	2.90	3.20	3.50	3.80	4.15	4.75
75	2.00	2.30	2.60	2.90	3.20	3.50	3.80	4.10	4.75
80	1.95	2.25	2.60	2.90	3.20	3.50	3.80	4.10	4.70

1/ THESE COSTS APPLY WHERE LOADING PRODUCTION IS LIMITED BY YARDING PRODUCTION.  
2/ IF VOLUME OF AVERAGE LOG DOES NOT FALL ON VOLUMES LISTED, USE COST OF THE NEXT LOWER LOG VOLUME.  
3/ IN THOSE CASES WHERE VOLUMES EXCEED THOSE LISTED, USE THE COST OF THE LARGEST LOG VOLUME FOR THE APPLICABLE YARDING DISTANCE.  
4/ CORRECTION FOR SLOPE - UPHILL YARDING - SUBTRACT \$0.07 FOR EACH 10 PER CENT OF SLOPE FROM 0 PER CENT TO 60 PER CENT. USE THE VALUE FOR 60 PER CENT FOR SLOPES EXCEEDING 60 PER CENT. DOWNHILL YARDING - ADD \$0.07 FOR EACH 10 PER CENT OF SLOPE FROM 0 TO 30 PER CENT. USE THE VALUE FOR 30 PER CENT FOR SLOPES EXCEEDING 30 PER CENT.  
5/ FOR DISTANCES EXCEEDING 1,000', ADD \$0.30 FOR EACH ADDITIONAL 100' OF YARDING DISTANCE.  
BASIC DATA, APPENDIX I, PAGES 130 AND 131, 255 & 256.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 17

HIGH LEAD RIGGING - WESTERN OREGON

Includes: Yarder and tree or tower  
Large mobile log loader  
Tractor w/dozer (yarding tractor)  
6 man yarding crew  
2 man loading crew  
2 man landing construction crew (part time)

- Medium Yarder (Rigged Spar Tree)

First Pole \$1,660

1/ Additional Pole 1,395 (each)

- Portable Tower - 65' Tower

First Pole 770

1/ Additional Poles 360 (each)

- Portable Tower - 110' Tower

First Pole 805

1/ Additional Poles 365 (each)

1/ Poles within 1/2 mile of previous pole.

Move in costs not included. See Table 1 for appropriate move in costs. These rigging costs are suggested as guidelines. The appraiser should judge each logging situation individually and develop appropriate rigging costs.

Basic Data, Appendix 1, Pages 132 thru 143

9333.3 - PRODUCTION COSTS

(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 18

PORTABLE TOWER YARDING AND LOADING - 65° TRAILER MOUNTED TOWER  
WESTERN OREGON

COSTS IN DOLLARS PER MBF GROSS VOLUME YARDED AND LOADED 1/ 2/

16 FT. LOG VOLUME SERIES DEC.C.	YARDING (SLOPE) DISTANCE IN FEET 3/ 4/									
	100	200	300	400	500	600	700	800	900	1000
8	38.50	39.80	41.15	42.45	43.75	45.10	46.40	47.70	49.05	50.35
10	28.85	30.15	31.45	32.80	34.10	35.40	36.75	38.05	39.35	40.70
12	22.35	23.65	24.95	26.30	27.60	28.90	30.25	31.55	32.85	34.20
14	18.00	19.30	20.60	21.95	23.25	24.55	25.90	27.20	28.50	29.85
16	15.05	16.35	17.70	19.00	20.30	21.65	22.95	24.25	25.60	26.90
18	13.10	14.40	15.70	17.05	18.35	19.65	21.00	22.30	23.60	24.95
20	11.75	13.10	14.40	15.70	17.05	18.35	19.65	21.00	22.30	23.60
22	10.85	12.20	13.50	14.80	16.15	17.45	18.75	20.10	21.40	22.70
24	10.25	11.55	12.90	14.20	15.50	16.85	18.15	19.45	20.80	22.10
26	9.85	11.15	12.50	13.80	15.10	16.45	17.75	19.05	20.40	21.70
28	9.55	10.90	12.20	13.50	14.85	16.15	17.45	18.80	20.10	21.40
30	9.35	10.70	12.00	13.30	14.65	15.95	17.25	18.60	19.90	21.20
35	9.10	10.40	11.70	13.05	14.35	15.65	17.00	18.30	19.60	20.95
40	8.95	10.25	11.60	12.90	14.20	15.55	16.85	18.15	19.50	20.80
45	8.85	10.20	11.50	12.80	14.15	15.45	16.75	18.10	19.40	20.70
50	8.80	10.10	11.45	12.75	14.05	15.40	16.70	18.00	19.35	20.65
55	8.75	10.05	11.40	12.70	14.00	15.35	16.65	17.95	19.30	20.60
60	8.70	10.00	11.35	12.65	13.95	15.30	16.60	17.90	19.25	20.55
65	8.65	9.95	11.30	12.60	13.90	15.25	16.55	17.85	19.20	20.50
70	8.60	9.90	11.25	12.55	13.85	15.20	16.50	17.80	19.15	20.45
75	8.55	9.85	11.20	12.50	13.80	15.15	16.45	17.75	19.10	20.40
80	8.50	9.80	11.15	12.45	13.75	15.10	16.40	17.70	19.05	20.35

1/ IF VOLUME OF AVERAGE LOG DOES NOT FALL ON VOLUMES LISTED, USE THE COST OF THE NEXT LOWER LOG VOLUME.  
2/ IN THOSE CASES WHERE VOLUMES EXCEED THOSE LISTED, USE THE COST OF THE LARGEST LOG VOLUME FOR THE APPLICABLE YARDING DISTANCE.

3/ CORRECTION FOR SLOPE - UPHILL YARDING - SUBTRACT \$0.28 FOR EACH 10 PER CENT OF SLOPE FROM J TO 60 PER CENT. USE THE VALUE FOR 60 PER CENT FOR SLOPES EXCEEDING 60 PER CENT. DOWNHILL YARDING - ADD \$0.28 FOR EACH 10 PER CENT OF SLOPE FROM 0 TO 30 PER CENT. USE THE VALUE FOR 30 PER CENT FOR SLOPES EXCEEDING 30 PER CENT.

4/ FOR DISTANCES EXCEEDING 1,000', ADD \$1.30 FOR EACH ADDITIONAL 100' OF YARDING DISTANCE.

BASIC DATA, APPENDIX I, PAGES 126, 127, 130, 131, 255 AND 256



9333.3 - PRODUCTION COSTS

(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 19

PORTABLE TOWER YARDING - 65' TRAILER MOUNTED TOWER  
WESTERN OREGON

COSTS IN DOLLARS PER MBF GROSS VOLUME YARDED 1/ 2/

16 FT. LOG VOLUME SCRIB. DEC.C.	100	200	300	400	500	600	700	800	900	1000
8	29.60	30.60	31.60	32.60	33.65	34.65	35.65	36.65	37.65	38.70
10	22.15	23.15	24.15	25.20	26.20	27.20	28.20	29.25	30.25	31.25
12	17.15	18.20	19.20	20.20	21.20	22.20	23.25	24.25	25.25	26.25
14	13.80	14.85	15.85	16.85	17.85	18.85	19.90	20.90	21.90	22.90
16	11.55	12.60	13.60	14.60	15.60	16.65	17.65	18.65	19.65	20.65
18	10.05	11.05	12.10	13.10	14.10	15.10	16.10	17.15	18.15	19.15
20	9.05	10.05	11.05	12.05	13.10	14.10	15.10	16.10	17.15	18.15
22	8.35	9.35	10.35	11.40	12.40	13.40	14.40	15.45	16.45	17.45
24	7.90	8.90	9.90	10.90	11.95	12.95	13.95	14.95	15.95	17.00
26	7.55	8.55	9.60	10.60	11.60	12.60	13.65	14.65	15.65	16.65
28	7.35	8.35	9.35	10.40	11.40	12.40	13.40	14.45	15.45	16.45
30	7.20	8.20	9.20	10.25	11.25	12.25	13.25	14.25	15.30	16.30
35	7.00	8.00	9.00	10.00	11.05	12.05	13.05	14.05	15.05	16.10
40	6.90	7.90	8.90	9.90	10.90	11.95	12.95	13.95	14.95	16.00
45	6.80	7.85	8.85	9.85	10.85	11.85	12.90	13.90	14.90	15.90
50	6.75	7.80	8.80	9.80	10.80	11.80	12.85	13.85	14.85	15.85
55	6.70	7.75	8.75	9.75	10.75	11.80	12.80	13.80	14.80	15.85
60	6.70	7.70	8.70	9.70	10.75	11.75	12.75	13.75	14.80	15.80
65	6.65	7.65	8.65	9.70	10.70	11.70	12.70	13.75	14.75	15.75
70	6.60	7.60	8.65	9.65	10.65	11.65	12.70	13.70	14.70	15.70
75	6.55	7.60	8.60	9.60	10.60	11.65	12.65	13.65	14.65	15.65
80	6.55	7.55	8.55	9.55	10.60	11.60	12.60	13.60	14.60	15.65

1/ IF VOLUME OF AVERAGE LOG DOES NOT FALL ON VOLUMES LISTED, USE THE COST OF THE NEXT LOWER LOG VOLUME.  
2/ IN THOSE CASES WHERE VOLUMES EXCEED THOSE LISTED, USE THE COST OF THE LARGEST LOG VOLUME FOR THE APPLICABLE YARDING DISTANCE.

3/ CORRECTION FOR SLOPE - UPHILL YARDING - SUBTRACT \$0.21 FOR EACH 10 PER CENT OF SLOPE FROM 0 TO 60 PER CENT. USE THE VALUE FOR 60 PER CENT FOR SLOPES EXCEEDING 60 PER CENT. DOWNHILL YARDING - ADD \$0.21 FOR EACH 10 PER CENT OF SLOPE FROM 0 TO 30 PER CENT. USE THE VALUE FOR 30 PER CENT FOR SLOPES EXCEEDING 30 PER CENT.

4/ FOR DISTANCES EXCEEDING 1,000', ADD \$1.00 FOR EACH ADDITIONAL 100' OF YARDING DISTANCE.

BASIC DATA, APPENDIX I, PAGES 126, 127, 255 AND 256







9333.3 - PRODUCTION COSTS

(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 21

PORTABLE TOWER YARDING - 110° TRAILER MOUNTED TOWER  
WESTERN OREGON

COSTS IN DOLLARS PER MBF GROSS VOLUME YARDED 1/ 2/

16 FT. LOG VOLUME SCRIB. DEC.C.	YARDING (SLOPE) DISTANCE IN FEET 3/ 4/						
	100	200	300	400	500	600	700
8	32.00	33.95	35.05	36.15	37.30	38.40	39.55
10	24.55	25.70	26.80	27.95	29.05	30.15	31.30
12	19.05	20.15	21.30	22.40	23.50	24.65	25.75
14	15.30	16.45	17.55	18.70	19.80	20.95	22.05
16	12.85	13.95	15.05	16.20	17.30	18.45	19.55
18	11.15	12.25	13.40	14.50	15.65	16.75	17.90
20	10.00	11.15	12.25	13.40	14.50	15.65	16.75
22	9.25	10.40	11.50	12.60	13.75	14.85	16.00
24	8.75	9.85	11.00	12.10	13.25	14.35	15.45
26	8.40	9.50	10.65	11.75	12.85	14.00	15.10
28	8.15	9.25	10.40	11.50	12.65	13.75	14.90
30	8.00	9.10	10.20	11.35	12.45	13.60	14.70
35	7.75	8.85	10.00	11.10	12.25	13.35	14.45
40	7.65	8.75	9.85	11.00	12.10	13.25	14.35
45	7.55	8.70	9.80	10.90	12.05	13.15	14.30
50	7.50	8.65	9.75	10.85	12.00	13.10	14.25
55	7.45	8.60	9.70	10.80	11.95	13.05	14.20
60	7.40	8.55	9.65	10.80	11.90	13.00	14.15
65	7.35	8.50	9.60	10.75	11.85	13.00	14.10
70	7.35	8.45	9.55	10.70	11.80	12.95	14.05
75	7.30	8.40	9.55	10.65	11.75	12.90	14.00
80	7.25	8.35	9.50	10.60	11.75	12.85	13.95
90							
100							

1/ IF VOLUME OF AVERAGE LOG DOES NOT FALL ON VOLUMES LISTED, USE THE COST OF THE NEXT LOWER LOG VOLUME.  
2/ IN THOSE CASES WHERE VOLUMES EXCEED THOSE LISTED, USE THE COST OF THE LARGEST LOG VOLUME FOR THE APPLICABLE YARDING DISTANCE.  
3/ CORRECTION FOR SLOPE - UPHILL YARDING - SUBTRACT \$0.23 FOR EACH 10 PER CENT OF SLOPE FROM 0 TO 60 PER CENT. USE THE VALUE FOR 60 PER CENT FOR SLOPES EXCEEDING 60 PER CENT. DOWNHILL YARDING - ADD \$0.23 FOR EACH 10 PER CENT OF SLOPE FROM 0 TO 30 PER CENT. USE THE VALUE FOR 30 PER CENT FOR SLOPES EXCEEDING 30 PER CENT.  
4/ FOR DISTANCES EXCEEDING 1,000', ADD \$1.15 FOR EACH ADDITIONAL 100' OF YARDING DISTANCE.

BASIC DATA, APPENDIX I, PAGES 128, 129, 255 AND 256

9333.3 - PRODUCTION COSTS  
(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 22

PORTABLE TOWER LOADING COSTS

See Table 16 - Loading - High-lead Operations

Basic Data, Appendix 1, Pages 130 & 131 , 255 & 256.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 23

STATIC SKYLINE RIGGING - WESTERN OREGON

120' Portable Tower

Includes: Tower and yarder, single drum sky car and  
associated rigging.

Large mobile log loader  
Tractor w/dozer (yarding tractor)  
8-man yarding and loading crew  
Tractor operator to assist in landing construction  
and rig up

First and each other additional pole                      \$2,700      (each)

Tail Holds

First Tail Hold    \$1,056

Additional Tail Holds    898

Move in costs not included. See Table 1 for appropriate move in costs. These rigging costs are suggested as guidelines. In order to develop appropriate rigging costs, the appraiser must have an understanding of basic skyline engineering, layout and design. He must be able to predict the location and number of skyline roads, tower or rigged tree setups, and tail holds.

Basic Data, Appendix 1, Pages 148 thru 153

9333.3 - PRODUCTION COSTS

(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 24A

STATIC SKYLINE YARDING AND LOADING-PORTABLE TOWER IN CLEAR CUTS  
WESTERN OREGON

COSTS IN DOLLARS PER MBF GROSS VOLUME YARDED AND LOADED 1/ 2/ 3/

16 FT. LOG VOLUME SCRIB. DEC.C.	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800
10	28.30	28.70	29.20	29.75	30.40	31.10	31.85	32.75	33.65	34.70	35.75	36.90	38.15	39.45
12	22.80	22.40	22.90	23.45	24.10	24.80	25.60	26.45	27.40	28.40	29.50	30.65	31.90	33.20
14	17.80	18.20	18.70	19.25	19.90	20.60	21.40	22.25	23.20	24.20	25.25	26.45	27.65	28.95
16	14.95	15.40	15.85	16.40	17.05	17.75	18.55	19.40	20.35	21.35	22.45	23.60	24.85	26.15
18	13.05	13.50	13.95	14.55	15.15	15.90	16.65	17.55	18.45	19.45	20.55	21.70	22.95	24.25
20	11.80	12.20	12.70	13.25	13.90	14.60	15.40	16.25	17.20	18.20	19.30	20.45	21.70	23.00
22	10.95	11.35	11.85	12.40	13.05	13.75	14.55	15.40	16.35	17.35	18.45	19.60	20.85	22.15
24	10.40	10.80	11.30	11.85	12.50	13.20	14.00	14.85	15.75	16.80	17.85	19.05	20.25	21.55
26	10.00	10.40	10.90	11.45	12.10	12.80	13.60	14.45	15.40	16.40	17.50	18.65	19.90	21.20
28	9.75	10.15	10.65	11.20	11.85	12.55	13.35	14.20	15.15	16.15	17.25	18.40	19.60	20.95
30	10.00	10.40	10.95	11.50	12.15	12.85	13.65	14.50	15.45	16.45	17.55	18.70	19.95	21.30
32	9.85	10.25	10.80	11.35	12.00	12.70	13.50	14.35	15.30	16.30	17.40	18.55	19.80	21.15
34	9.80	10.20	10.75	11.30	11.95	12.65	13.45	14.30	15.25	16.25	17.35	18.50	19.75	21.10
36	9.75	10.15	10.70	11.25	11.90	12.60	13.40	14.25	15.20	16.20	17.30	18.45	19.70	21.05
38	9.70	10.10	10.65	11.20	11.85	12.55	13.35	14.20	15.15	16.15	17.25	18.40	19.65	21.00
40	10.15	10.55	11.10	11.65	12.30	13.00	13.80	14.65	15.60	16.60	17.70	18.85	20.10	21.45
45	10.15	10.55	11.10	11.65	12.30	13.00	13.80	14.65	15.60	16.60	17.70	18.85	20.10	21.45
50	10.15	10.55	11.10	11.65	12.30	13.00	13.80	14.65	15.60	16.60	17.70	18.85	20.10	21.45
55	10.15	10.55	11.10	11.65	12.30	13.00	13.80	14.65	15.60	16.60	17.70	18.85	20.10	21.45
60	10.10	10.50	11.05	11.60	12.25	12.95	13.75	14.60	15.55	16.55	17.65	18.80	20.05	21.40
65	10.10	10.50	11.05	11.60	12.25	12.95	13.75	14.60	15.55	16.55	17.65	18.80	20.05	21.40
70	10.10	10.50	11.05	11.60	12.25	12.95	13.75	14.60	15.55	16.55	17.65	18.80	20.05	21.40
75	10.10	10.50	11.05	11.60	12.25	12.95	13.75	14.60	15.55	16.55	17.65	18.80	20.05	21.40
80	10.10	10.50	11.05	11.60	12.25	12.95	13.75	14.60	15.55	16.55	17.65	18.80	20.05	21.40
85	10.10	10.50	11.05	11.60	12.25	12.95	13.75	14.60	15.55	16.55	17.65	18.80	20.05	21.40

1/ IF AVERAGE LOG VOLUME DOES NOT FALL ON VOLUME LISTED, USE THE COST OF THE NEXT LOWER LOG VOLUME.  
2/ IN THOSE CASES WHERE VOLUMES EXCEED THOSE LISTED, USE THE COST OF THE LARGEST LOG VOLUME FOR THE APPLICABLE YARDING DISTANCE.  
3/ YARDING EQUIPMENT: YARDER, SINGLE DRUM, PORTABLE TOWER, RADIO-CONTROLLED SKYCAR.



9333.3 - PRODUCTION COSTS

(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 24B

STATIC SKYLINE YARDING AND LOADING-PORTABLE TOWER IN CLEAR CUTS  
WESTERN OREGON

COSTS IN DOLLARS PER MBF GROSS VOLUME YARDED AND LOADED 1/ 2/ 3/

16 FT. LOG VOLUME SCRIB.	YARDING (SLOPE) DISTANCE IN FEET 4/													
	1900	2000	2100	2200	2300	2400	2500	2600	2700	2800	2900	3000	3100	3200
10	40.85	42.30	43.85	45.45	47.15	48.90	50.75	52.65	54.60	56.70	58.80	61.00	63.30	65.65
12	34.55	36.05	37.55	39.15	40.85	42.60	44.45	46.35	48.35	50.40	52.55	54.75	57.00	59.35
14	30.35	31.80	33.35	34.95	36.65	38.40	40.25	42.15	44.15	46.20	48.30	50.50	52.80	55.15
16	27.55	29.00	30.55	32.15	33.80	35.60	37.40	39.30	41.30	43.35	45.50	47.70	50.00	52.35
18	25.65	27.10	28.65	30.25	31.95	33.70	35.50	37.45	39.40	41.45	43.60	45.80	48.10	50.45
20	24.40	25.85	27.35	28.90	30.65	32.40	34.25	36.15	38.15	40.20	42.35	44.55	46.80	49.20
22	23.55	25.00	26.50	28.15	29.80	31.55	33.40	35.30	37.30	39.35	41.50	43.70	45.95	48.35
24	22.95	24.40	25.95	27.55	29.25	31.00	32.85	34.75	36.70	38.80	40.90	43.10	45.40	47.75
26	22.55	24.05	25.55	27.15	28.85	30.60	32.45	34.35	36.35	38.40	40.55	42.75	45.00	47.40
28	22.30	23.80	25.30	26.90	28.60	30.35	32.20	34.10	36.10	38.15	40.25	42.50	44.75	47.10
30	22.15	23.60	25.15	26.75	28.45	30.20	32.00	33.95	35.90	37.95	40.10	42.30	44.60	46.95
32	22.05	23.50	25.00	26.65	28.30	30.05	31.90	33.80	35.80	37.85	40.00	42.20	44.50	46.85
34	21.95	23.40	24.95	26.55	28.25	30.00	31.85	33.75	35.70	37.80	39.90	42.10	44.40	46.75
36	21.90	23.35	24.90	26.50	28.20	29.95	31.80	33.70	35.65	37.75	39.85	42.05	44.35	46.70
38	21.85	23.35	24.85	26.45	28.15	29.90	31.75	33.65	35.65	37.70	39.80	42.05	44.30	46.65
40	21.85	23.30	24.85	26.45	28.15	29.90	31.70	33.65	35.60	37.65	39.80	42.00	44.30	46.65
45	21.80	23.25	24.80	26.40	28.10	29.85	31.70	33.60	35.60	37.65	39.75	42.00	44.25	46.60
50	21.80	23.25	24.80	26.40	28.10	29.85	31.70	33.60	35.55	37.65	39.75	41.95	44.25	46.60
55	21.80	23.25	24.80	26.40	28.10	29.85	31.70	33.60	35.55	37.60	39.75	41.95	44.25	46.60
60	21.80	23.25	24.80	26.40	28.10	29.85	31.65	33.60	35.55	37.60	39.75	41.95	44.25	46.60
65	21.80	23.25	24.80	26.40	28.10	29.85	31.65	33.60	35.55	37.60	39.75	41.95	44.25	46.60
70	21.80	23.25	24.80	26.40	28.10	29.85	31.65	33.60	35.55	37.60	39.75	41.95	44.25	46.60
75	21.80	23.25	24.80	26.40	28.10	29.85	31.65	33.60	35.55	37.60	39.75	41.95	44.25	46.60
80	21.80	23.25	24.80	26.40	28.10	29.85	31.65	33.60	35.55	37.60	39.75	41.95	44.25	46.60
85	21.80	23.25	24.80	26.40	28.10	29.85	31.65	33.60	35.55	37.60	39.75	41.95	44.25	46.60

1/ IF AVERAGE LOG VOLUME DOES NOT FALL ON VOLUME LISTED, USE THE COST OF THE NEXT LOWER LOG VOLUME.  
2/ IN THOSE CASES WHERE VOLUMES EXCEED THOSE LISTED, USE THE COST OF THE LARGEST LOG VOLUME FOR THE APPLICABLE YARDING DISTANCE.

3/ YARDING EQUIPMENT: YARDER, SINGLE DRUM, PORTABLE TOWER, RADIO-CONTROLLED SKYCAR.

4/ ADD \$2.35 FOR EACH ADDITIONAL 100 FT. BEYOND 3200 FT.

BASIC DATA, APPENDIX I, PAGES 144 THRU 147, 257 THRU 259



9333.3 - PRODUCTION COSTS

(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 25A

STATIC SKYLINE YARDING-PORTABLE TOWER IN CLEAR CUTS  
WESTERN OREGON

COSTS IN DOLLARS PER MBF GROSS VOLUME YARDED 1/ 2/ 3/

16 FT. LOG VOLUME SCRIB. DEC.C.	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800
10	24.50	24.85	25.25	25.75	26.30	26.90	27.60	28.35	29.15	30.00	30.95	31.95	33.05	34.15
12	19.05	19.40	19.80	20.30	20.85	21.45	22.15	22.90	23.70	24.60	25.50	26.55	27.60	28.75
14	15.40	15.75	16.20	16.65	17.20	17.85	18.50	19.25	20.05	20.95	21.90	22.90	23.95	25.10
16	12.95	13.30	13.75	14.20	14.75	15.40	16.05	16.80	17.60	18.50	19.45	20.45	21.50	22.65
18	11.30	11.65	12.10	12.60	13.15	13.75	14.45	15.15	16.00	16.85	17.80	18.80	19.85	21.00
20	10.20	10.60	11.00	11.50	12.05	12.65	13.35	14.05	14.90	15.75	16.70	17.70	18.75	19.90
22	9.50	9.85	10.25	10.75	11.30	11.90	12.60	13.35	14.15	15.00	15.95	16.95	18.05	19.15
24	9.00	9.35	9.75	10.25	10.80	11.40	12.10	12.85	13.65	14.55	15.45	16.45	17.55	18.65
26	8.65	9.00	9.45	9.90	10.45	11.10	11.75	12.50	13.30	14.20	15.15	16.15	17.20	18.35
28	8.45	8.80	9.20	9.70	10.25	10.85	11.55	12.30	13.10	14.00	14.90	15.90	17.00	18.10
30		8.65	9.05	9.55	10.10	10.70	11.40	12.15	12.95	13.85	14.75	15.75	16.85	17.95
32		8.55	8.95	9.45	10.00	10.60	11.30	12.05	12.85	13.75	14.65	15.65	16.75	17.85
34		8.50	8.90	9.40	9.95	10.55	11.25	12.00	12.80	13.65	14.60	15.60	16.65	17.80
36		8.45	8.85	9.35	9.90	10.50	11.20	11.95	12.75	13.60	14.55	15.55	16.65	17.75
38		8.40	8.85	9.30	9.85	10.50	11.15	11.90	12.70	13.60	14.55	15.55	16.60	17.75
40			8.60	9.30	9.85	10.45	11.15	11.90	12.70	13.55	14.50	15.50	16.60	17.70
45			8.00	9.25	9.80	10.45	11.10	11.85	12.65	13.55	14.50	15.50	16.55	17.70
50			8.75	9.25	9.80	10.40	11.10	11.85	12.65	13.55	14.45	15.45	16.55	17.70
55			8.75	9.25	9.80	10.40	11.10	11.85	12.65	13.55	14.45	15.45	16.55	17.65
60			8.75	9.25	9.80	10.40	11.10	11.85	12.65	13.55	14.45	15.45	16.55	17.65
65			8.75	9.25	9.80	10.40	11.10	11.85	12.65	13.55	14.45	15.45	16.55	17.65
70			8.75	9.25	9.80	10.40	11.10	11.85	12.65	13.55	14.45	15.45	16.55	17.65
75			8.75	9.25	9.80	10.40	11.10	11.85	12.65	13.55	14.45	15.45	16.55	17.65
80			8.75	9.25	9.80	10.40	11.10	11.85	12.65	13.55	14.45	15.45	16.55	17.65
85			8.75	9.25	9.80	10.40	11.10	11.85	12.65	13.55	14.45	15.45	16.55	17.65

1/ IF AVERAGE LOG VOLUME DOES NOT FALL ON VOLUME LISTED, USE THE COST OF THE NEXT LOWER LOG VOLUME.

2/ IN THOSE CASES WHERE VOLUMES EXCEED THOSE LISTED, USE THE COST OF THE LARGEST LOG VOLUME FOR THE APPLICABLE YARDING DISTANCE.

3/ YARDING EQUIPMENT: YARDER, SINGLE DRUM, PORTABLE TOWER, RADIO-CONTROLLED SKYCAR.



9333.3 - PRODUCTION COSTS

(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 25B

STATIC SKYLINE YARDING-PORTABLE TOWER IN CLEAR CUTS  
WESTERN OREGON

COSTS IN DOLLARS PER MBF GROSS VOLUME YARDED 1/ 2/ 3/

16 FT. LOG VOLUME SCRTB. DEC.C.	1900	2000	2100	2200	2300	2400	2500	2600	2700	2800	2900	3000	3100	3200
10	35.35	36.65	37.95	39.35	40.80	42.35	43.90	45.55	47.30	49.05	50.90	52.80	54.80	56.85
12	29.95	31.20	32.50	33.90	35.35	36.90	38.50	40.15	41.85	43.65	45.45	47.40	49.35	51.40
14	26.30	27.55	28.85	30.25	31.70	33.25	34.85	36.50	38.20	40.00	41.85	43.75	45.70	47.75
16	23.85	25.10	26.45	27.80	29.30	30.80	32.40	34.05	35.75	37.55	39.40	41.30	43.25	45.30
18	22.20	23.45	24.80	26.20	27.65	29.15	30.75	32.40	34.10	35.90	37.75	39.65	41.65	43.65
20	21.10	22.35	23.70	25.10	26.55	28.05	29.65	31.30	33.00	34.80	36.65	38.55	40.55	42.60
22	20.35	21.65	22.95	24.35	25.80	27.35	28.90	30.55	32.30	34.05	35.90	37.80	39.80	41.85
24	19.85	21.15	22.45	23.85	25.30	26.85	28.40	30.05	31.80	33.55	35.40	37.35	39.30	41.35
26	19.55	20.80	22.15	23.55	25.00	26.50	28.10	29.75	31.45	33.25	35.10	37.00	38.95	41.00
28	19.30	20.60	21.90	23.30	24.75	26.30	27.85	29.50	31.25	33.00	34.85	36.80	38.75	40.80
30	19.15	20.45	21.75	23.15	24.60	26.15	27.70	29.35	31.10	32.85	34.70	36.65	38.60	40.65
32	19.05	20.35	21.65	23.05	24.50	26.05	27.60	29.25	31.00	32.75	34.60	36.55	38.50	40.55
34	19.00	20.25	21.60	23.00	24.45	25.95	27.55	29.20	30.90	32.70	34.55	36.45	38.45	40.50
36	18.95	20.20	21.55	22.95	24.40	25.90	27.50	29.15	30.90	32.65	34.50	36.40	38.40	40.45
38	18.95	20.20	21.50	22.90	24.35	25.90	27.50	29.15	30.85	32.65	34.50	36.40	38.35	40.40
40	18.90	20.15	21.50	22.90	24.35	25.85	27.45	29.10	30.85	32.60	34.45	36.35	38.35	40.40
45	18.90	20.15	21.50	22.85	24.35	25.85	27.45	29.10	30.80	32.60	34.45	36.35	38.30	40.35
50	18.90	20.15	21.45	22.85	24.30	25.85	27.45	29.10	30.80	32.60	34.40	36.35	38.30	40.35
55	18.85	20.15	21.45	22.85	24.30	25.85	27.40	29.05	30.80	32.55	34.40	36.35	38.30	40.35
60	18.85	20.15	21.45	22.85	24.30	25.85	27.40	29.05	30.80	32.55	34.40	36.35	38.30	40.35
65	18.85	20.15	21.45	22.85	24.30	25.85	27.40	29.05	30.80	32.55	34.40	36.35	38.30	40.35
70	18.85	20.15	21.45	22.85	24.30	25.85	27.40	29.05	30.80	32.55	34.40	36.35	38.30	40.35
75	18.85	20.15	21.45	22.85	24.30	25.85	27.40	29.05	30.80	32.55	34.40	36.35	38.30	40.35
80	18.85	20.15	21.45	22.85	24.30	25.85	27.40	29.05	30.80	32.55	34.40	36.35	38.30	40.35
85	18.85	20.15	21.45	22.85	24.30	25.85	27.40	29.05	30.80	32.55	34.40	36.35	38.30	40.35

1/ IF AVERAGE LOG VOLUME DOES NOT FALL ON VOLUME LISTED, USE THE COST OF THE NEXT LOWER LOG VOLUME.  
2/ IN THOSE CASES WHERE VOLUMES EXCEED THOSE LISTED, USE THE COST OF THE LARGEST LOG VOLUME FOR THE APPLICABLE YARDING DISTANCE.

3/ YARDING EQUIPMENT: YARDER, SINGLE DRUM, PORTABLE TOWER, RADIO-CONTROLLED SKYCAR.

4/ ADD \$2.80 FOR EACH ADDITIONAL 100 FT. BEYOND 3200 FT.  
BASIC DATA, APPENDIX I, PAGES 144, 145, 257 THRU 259



9333.3 - PRODUCTION COSTS

(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 26

SWINGING AND LOADING - HIGH-LEAD HOT DECK SWINGING  
WESTERN OREGON  
COSTS IN DOLLARS PER MBF GROSS VOLUME SWUNG AND LOADED 1/ 2/

16 FT. LOG VOLUME SCRIB. DEC.C.	YARDING (SLOPE) DISTANCE IN FEET 3/ 4/							
	100	200	300	400	500	600	700	800
8	22.20	22.95	23.75	24.50	25.25	26.00	26.75	27.50
10	16.65	17.40	18.15	18.90	19.65	20.40	21.15	21.90
12	12.90	13.65	14.40	15.15	15.90	16.65	17.40	18.15
14	10.35	11.10	11.85	12.60	13.35	14.10	14.85	15.60
16	8.70	9.45	10.20	10.95	11.70	12.45	13.20	13.95
18	7.55	8.30	9.05	9.80	10.55	11.30	12.05	12.80
20	6.80	7.55	8.30	9.05	9.80	10.55	11.30	12.05
22	6.25	7.00	7.75	8.50	9.25	10.00	10.75	11.50
24	5.90	6.65	7.40	8.15	8.90	9.65	10.40	11.15
26	5.70	6.45	7.20	7.95	8.70	9.45	10.20	10.95
28	5.50	6.25	7.00	7.75	8.50	9.25	10.00	10.75
30	5.40	6.15	6.90	7.65	8.40	9.15	9.90	10.65
35	5.25	6.00	6.75	7.50	8.25	9.00	9.75	10.50
40	5.15	5.90	6.65	7.40	8.15	8.90	9.65	10.40
45	5.10	5.85	6.60	7.35	8.10	8.85	9.60	10.35
50	5.10	5.85	6.60	7.35	8.10	8.85	9.60	10.35
55	5.05	5.80	6.55	7.30	8.05	8.80	9.55	10.30
60	5.00	5.75	6.50	7.25	8.00	8.75	9.50	10.25
65	5.00	5.75	6.50	7.25	8.00	8.75	9.50	10.25
70	4.95	5.70	6.45	7.20	7.95	8.70	9.45	10.20
75	4.95	5.70	6.45	7.20	7.95	8.70	9.45	10.20
80	4.90	5.65	6.40	7.15	7.90	8.65	9.40	10.15

1/ IF VOLUME OF AVERAGE LOG DOES NOT FALL ON VOLUMES LISTED, USE THE COST OF THE NEXT LOWER LOG VOLUME.  
2/ IN THOSE CASES WHERE VOLUMES EXCEED THOSE LISTED, USE THE COST OF THE LARGEST LOG VOLUME FOR THE APPLICABLE YARDING DISTANCE.  
3/ CORRECTION FOR SLOPE - UPHILL YARDING - SUBTRACT \$0.16 FOR EACH 10 PER CENT OF SLOPE FROM 0 TO 60 PER CENT. USE THE VALUE FOR 60 PER CENT FOR SLOPES EXCEEDING 60 PER CENT. DOWNHILL YARDING - ADD \$0.16 FOR EACH 10 PER CENT OF SLOPE FROM 0 TO 30 PER CENT. USE THE VALUE FOR 30 PER CENT FOR SLOPES EXCEEDING 30 PER CENT.  
4/ FOR DISTANCES EXCEEDING 1,000', ADD \$0.75 FOR EACH ADDITIONAL 100' OF YARDING DISTANCE.

BASIC DATA, APPENDIX I, PAGES 154, 155, 255 AND 256



9333.3 - PRODUCTION COSTS

(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 27

HIGH-LEAD HOT DECK SWINGING  
WESTERN OREGON

COSTS IN DOLLARS PER MBF GROSS VOLUME SWUNG 1/ 2/

16 FT. LOG VOLUME SCRIB. DEC.G.	YARDING (SLOPE) DISTANCE IN FEET 3/ 4/						
	100	200	300	400	500	600	700
8	13.30	13.75	14.20	14.65	15.10	15.55	16.00
10	9.95	10.40	10.85	11.30	11.75	12.20	12.65
12	7.70	8.15	8.60	9.05	9.50	10.00	10.45
14	6.20	6.65	7.10	7.55	8.00	8.50	8.95
16	5.20	5.65	6.10	6.55	7.00	7.45	7.90
18	4.50	4.95	5.40	5.90	6.35	6.80	7.25
20	4.05	4.50	4.95	5.40	5.90	6.35	6.80
22	3.75	4.20	4.65	5.10	5.55	6.00	6.50
24	3.55	4.00	4.45	4.90	5.35	5.80	6.25
26	3.40	3.85	4.30	4.75	5.20	5.65	6.10
28	3.30	3.75	4.20	4.65	5.10	5.55	6.00
30	3.25	3.70	4.15	4.60	5.05	5.50	5.95
35	3.15	3.60	4.05	4.50	4.95	5.40	5.85
40	3.10	3.55	4.00	4.45	4.90	5.35	5.80
45	3.05	3.50	3.95	4.40	4.90	5.35	5.80
50	3.05	3.50	3.95	4.40	4.85	5.30	5.75
55	3.00	3.45	3.90	4.35	4.80	5.25	5.70
60	3.00	3.45	3.90	4.35	4.80	5.25	5.70
65	3.00	3.45	3.90	4.35	4.80	5.25	5.70
70	2.95	3.40	3.90	4.35	4.80	5.25	5.70
75	2.95	3.40	3.85	4.30	4.75	5.20	5.70
80	2.95	3.40	3.85	4.30	4.75	5.20	5.65
900							
1000							

1/ IF VOLUME OF AVERAGE LOG DOES NOT FALL ON VOLUMES LISTED, USE THE COST OF THE NEXT LOWER LOG VOLUME.  
2/ IN THOSE CASES WHERE VOLUMES EXCEED THOSE LISTED, USE THE COST OF THE LARGEST LOG VOLUME FOR THE APPLICABLE YARDING DISTANCE.  
3/ CORRECTION FOR SLOPE - UPHILL YARDING - SUBTRACT \$0.09 FOR EACH 10 PER CENT OF SLOPE FROM 0 TO 60 PER CENT. USE THE VALUE FOR 60 PER CENT FOR SLOPES EXCEEDING 60 PER CENT. DOWNHILL YARDING - ADD \$0.09 FOR EACH 10 PER CENT OF SLOPE FROM 0 TO 30 PER CENT. USE THE VALUE FOR 30 PER CENT FOR SLOPES EXCEEDING 30 PER CENT.  
4/ FOR DISTANCES EXCEEDING 1,000', ADD \$0.45 FOR EACH ADDITIONAL 100' OF YARDING DISTANCE.

BASIC DATA, APPENDIX I, PAGES 154, 155, 255, AND 256

9333.3 - PRODUCTION COSTS  
(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 28

SWING POLE RIGGING - WESTERN OREGON

Tree used for swinging -

Includes: Medium yarder  
Tractor w/dozer (yarding tractor)  
2 man swing crew  
Tractor operator to construct landing

Swing Pole Rigging Cost                      \$645

Hot Deck

Move in cost not included. For hot deck swinging, add move in cost of extra yarder from Table 1. This rigging cost is suggested as a guide. The appraiser should judge each logging situation individually and develop appropriate rigging costs.

Cold Deck

Normally swinging requires no extra yarder. Therefore, no additional move in cost would normally be allowed. However, the appraiser's logging plan may require two yarders and thus an additional move in allowance. This rigging cost is suggested as a guide. The appraiser should judge each logging situation individually and develop appropriate rigging costs.

Basic Data, Appendix 1, Pages 156 & 157



9333.3 - PRODUCTION COSTS  
(Schedule 19)  
RIGGING, YARDING AND LOADING

TABLE 29

COLD DECK SWINGING  
Western Oregon

Costs in Dollars per MBF of Gross Volume Actually Swung

16 Ft. Log Volume Scrib. <u>Dec. C.</u>	<u>Hook and Unhook Cost</u>	<u>Swinging Cost per 100' Swing Distance</u>
20	\$7.55	\$0.57
30	6.54	0.35
35	5.75	0.35
40	4.98	0.35
45	4.22	0.35
50	3.76	0.35
55	3.23	0.35
60	3.00	0.35
65	2.77	0.11
<u>1/</u> 70	2.56	0.11

1/ In those cases where volumes exceed those listed, use the Hook and Unhook cost for the largest log volume listed.

Basic Data, Appendix 1, Pages 154 & 155

9333.3 - PRODUCTION COSTS  
(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 30

COLD DECK LOADING  
WESTERN AND EASTERN OREGON

For Western and Eastern Oregon

Tractor Loader	\$1.29/MBF
Rubber-tired Loader	\$1.52/MBF

The cost is based on operating cost of a heavy mobile loader operation loading 165 M per eight hour day. (Loader - Link Belt TL-98 or HC-98)

Basic Data, Appendix 1, Pages 158 & 159



9333.3 - PRODUCTION COSTS  
(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 31

LIGHT MOBILE LOADER RIGGING  
WESTERN AND EASTERN OREGON

Includes: Light mobile Loader - Ramey Model M  
Yarding tractor  
Tractor and loader operators  
Choker setter

	<u>Western Oregon</u>
First Landing	\$60
<u>1/</u> Additional Landings	\$30 each)

Move in costs not included. See Table 1 or Table 2 for appropriate move in cost. Move in costs are based upon a move in distance of 35 miles. If negotiated sales are being appraised, actual move in distance should be determined and move in cost adjusted accordingly.

- 1/ The additional landings are considered to be within less than one half hour loader moving time from preceding landings. Care should be taken to adjust when actual conditions vary from this premise. If negotiated sales are being appraised, moving time between landings may be accurately estimated and cost of additional landings adjusted accordingly. Yarding tractor move in cost (Tables 1 and 2); rigging costs (Tables 9 and 13); and tractor yarding costs (Tables 7 and 11).

Basic Data, Appendix 1, Pages 160A thru 163

LIGHT MOBILE LOADER LOADING COSTS

Based on 150/M day - \$1.32

Basic Data, Appendix 1, Pages 160 and 161

9333.3 - PRODUCTION COSTS

(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 32

YARDING BY LIGHT YARDER-LOADER  
WESTERN OREGON  
COSTS IN DOLLARS PER MBF GROSS VOLUME YARDED 1/

16 FT. LOG VOLUME SCRIB. DEC.C.	50	100	150	200	250	300	350	400	450	500
4	22.50	23.35	24.15	25.00	25.85	26.70	27.50	28.35	29.20	30.00
6	21.35	22.20	23.05	23.85	24.70	25.55	26.40	27.20	28.05	28.90
8	20.25	21.10	21.90	22.75	23.60	24.45	25.25	26.10	26.95	27.75
10	19.15	20.00	20.85	21.65	22.50	23.35	24.15	25.00	25.85	26.70
12	18.10	18.90	19.75	20.60	21.45	22.25	23.10	23.95	24.75	25.60
14	17.05	17.85	18.70	19.55	20.40	21.20	22.05	22.90	23.70	24.55
16	16.00	16.85	17.70	18.50	19.35	20.20	21.00	21.85	22.70	23.55
18	15.00	15.85	16.70	17.50	18.35	19.20	20.00	20.85	21.70	22.55
20	14.00	14.85	15.70	16.55	17.35	18.20	19.05	19.85	20.70	21.55
22	13.05	13.90	14.75	15.55	16.40	17.25	18.10	18.90	19.75	20.60
24	12.10	12.95	13.80	14.65	15.45	16.30	17.15	18.00	18.80	19.65
26	11.20	12.05	12.90	13.70	14.55	15.40	16.20	17.05	17.90	18.75
28	10.30	11.15	12.00	12.80	13.65	14.50	15.35	16.15	17.00	17.85
30	9.45	10.30	11.10	11.95	12.80	13.60	14.45	15.30	16.15	16.95
32	8.60	9.45	10.25	11.10	11.95	12.75	13.60	14.45	15.30	16.10
34	7.75	8.60	9.45	10.25	11.10	11.95	12.80	13.60	14.45	15.30
36	6.95	7.80	8.65	9.45	10.30	11.15	11.95	12.80	13.65	14.50
38	6.20	7.00	7.85	8.70	9.50	10.35	11.20	12.05	12.85	13.70
42	4.65	5.50	6.35	7.20	8.00	8.85	9.70	10.55	11.35	12.20
46	3.25	4.10	4.95	5.75	6.60	7.45	8.30	9.10	9.95	10.80
50		2.75	3.60	4.45	5.30	6.10	6.95	7.80	8.60	9.45
54				3.20	4.05	4.90	5.70	6.55	7.40	8.20
58					2.90	3.75	4.55	5.40	6.25	7.05
62							3.50	4.35	5.20	6.00

1/ IN THOSE CASES WHERE VOLUMES EXCEED THOSE LISTED, USE THE COST OF THE LARGEST LOG VOLUME FOR THE APPLICABLE YARDING DISTANCE.

BASIC DATA, APPENDIX 1, PAGES 164, 165 & 260



9333.3 - PRODUCTION COSTS

(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 32A

YARDING BY LIGHT YARDER-LOADER  
EASTERN OREGON

COSTS IN DOLLARS PER MBF GROSS VOLUME YARDED 1/

16 FT. LOG VOLUME SCRIB. DEC.C.	50	100	150	200	250	300	350	400	450	500
4	19.60	20.30	21.05	21.75	22.50	23.20	23.95	24.65	25.40	26.15
6	18.60	19.30	20.05	20.75	21.50	22.25	22.95	23.70	24.40	25.15
8	17.60	18.35	19.10	19.80	20.55	21.25	22.00	22.70	23.45	24.15
10	16.65	17.40	18.15	18.85	19.60	20.30	21.05	21.75	22.50	23.20
12	15.75	16.45	17.20	17.90	18.65	19.40	20.10	20.85	21.55	22.30
14	14.85	15.55	16.30	17.00	17.75	18.45	19.20	19.90	20.65	21.35
16	13.95	14.65	15.40	16.10	16.85	17.55	18.30	19.05	19.75	20.50
18	13.05	13.80	14.50	15.25	15.95	16.70	17.40	18.15	18.90	19.60
20	12.20	12.95	13.65	14.40	15.10	15.85	16.55	17.30	18.00	18.75
22	11.35	12.10	12.80	13.55	14.30	15.00	15.75	16.45	17.20	17.90
24	10.55	11.30	12.00	12.75	13.45	14.20	14.90	15.65	16.35	17.10
26	9.75	10.50	11.20	11.95	12.65	13.40	14.10	14.85	15.55	16.30
28	9.00	9.70	10.45	11.15	11.90	12.60	13.35	14.05	14.80	15.50
30	8.20	8.95	9.65	10.40	11.15	11.85	12.60	13.30	14.05	14.75
32	7.50	8.20	8.95	9.65	10.40	11.10	11.85	12.55	13.30	14.05
34	6.75	7.50	8.20	8.95	9.65	10.40	11.10	11.85	12.60	13.30
36	6.05	6.80	7.50	8.25	8.95	9.70	10.40	11.15	11.90	12.60
38	5.35	6.10	6.85	7.55	8.30	9.00	9.75	10.45	11.20	11.90
42	4.05	4.80	5.50	6.25	7.00	7.70	8.45	9.15	9.90	10.60
46	2.85	3.55	4.30	5.00	5.75	6.50	7.20	7.95	8.65	9.40
50			3.15	3.85	4.60	5.30	6.05	6.80	7.50	8.25
54				2.80	3.50	4.25	4.95	5.70	6.45	7.15
58					2.50	3.25	3.95	4.70	5.45	6.15
62							3.05	3.80	4.50	5.25

1/ IN THOSE CASES WHERE VOLUMES EXCEED THOSE LISTED, USE THE COST OF THE LARGEST LOG VOLUME FOR THE APPLICABLE YARDING DISTANCE.

BASIC DATA, APPENDIX I, PAGES 164A, 165A and 260.

9333.3 - PRODUCTION COSTS  
(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 33

LIGHT YARDER LOADER - RIGGING  
WESTERN AND EASTERN OREGON

Includes: Light yarder-loader - Washington Trakloader TL-6  
3 man logging crew  
Loading engineer  
Choker setter  
Chaser (Knot Bumper)

	<u>Western</u> <u>Oregon</u>	<u>Eastern</u> <u>Oregon</u>
Each Landing	\$49 (each)	\$43 (each)

Move in costs are not included.

LIGHT YARDER LOADER - LOADING  
WESTERN AND EASTERN OREGON  
(Washington Trakloader TL-6)

(Based on rate of 165 MBF per day)

Loading Cost	\$2.35	per MBF
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Basic Data, Appendix 1, Pages 166 thru 169



9333.3 - PRODUCTION COSTS

(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 34

YARDING WITH LIGHT CRAWLER TRACTOR - COMMERCIAL THINNINGS  
WESTERN OREGON

COSTS IN DOLLARS PER MBF GROSS VOLUME YARDED

16 FT. SCRIB. LOG VOLUME	YARDING DISTANCE IN FEET 1/ 2/									
	100	200	300	400	500	600	700	800	900	1000
10	55.35	57.70	60.00	62.30	64.60	66.95	69.25	71.55	73.90	76.20
20	27.95	29.10	30.25	31.45	32.60	33.75	34.90	36.05	37.20	38.40
35	16.15	16.80	17.45	18.10	18.80	19.45	20.10	20.75	21.45	22.10
50	11.40	11.85	12.35	12.80	13.25	13.70	14.20	14.65	15.10	15.55
60	9.60	10.00	10.35	10.75	11.15	11.55	11.90	12.30	12.70	13.05
70	8.30	8.65	8.95	9.30	9.65	9.95	10.30	10.60	10.95	11.30
85	6.90	7.20	7.45	7.70	8.00	8.25	8.55	8.80	9.10	9.35
95	6.25	6.50	6.75	7.00	7.30	7.55	7.80	8.05	8.30	8.55
110	5.45	5.70	5.95	6.20	6.50	6.75	7.00	7.25	7.50	7.75
130	4.80	5.05	5.30	5.55	5.85	6.10	6.35	6.60	6.90	7.15
150	4.30	4.60	4.85	5.10	5.40	5.65	5.90	6.20	6.45	6.70
170	4.00	4.25	4.55	4.80	5.05	5.35	5.60	5.90	6.15	6.45
185	3.75	4.00	4.25	4.55	4.80	5.05	5.35	5.60	5.85	6.15
195	3.65	3.90	4.15	4.45	4.70	5.00	5.25	5.50	5.80	6.05
215	3.45	3.70	4.00	4.25	4.55	4.85	5.10	5.40	5.65	5.95
250	3.15	3.40	3.70	3.95	4.25	4.50	4.80	5.05	5.35	5.60
305	2.95	3.25	3.55	3.80	4.10	4.40	4.70	5.00	5.30	5.55
330	2.80	3.05	3.35	3.65	3.90	4.20	4.50	4.75	5.05	5.30

1/ DISTANCE LOGS ACTUALLY TRAVEL FROM CHOKER SETTING POINT TO LANDING.  
2/ FOR DISTANCES EXCEEDING 1,000', ADD \$0.35 FOR EACH ADDITIONAL 100' OF YARDING DISTANCE.

BASIC DATA, APPENDIX I, PAGES 170, 171, 261 THRU 263

9333.3 - PRODUCTION COSTS

(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 35

YARDING WITH RUBBER-TIRED SKIDDER - COMMERCIAL THINNINGS  
WESTERN OREGON

COSTS IN DOLLARS PER MBF GROSS VOLUME YARDED

16 FT. SCRIB. LOG VOLUME	YARDING DISTANCE IN FEET 1/ 2/									
	100	200	300	400	500	600	700	800	900	1000
10	37.15	38.40	39.60	40.75	41.85	42.95	43.95	44.95	45.85	46.75
20	18.95	19.55	20.15	20.75	21.30	21.85	22.35	22.85	23.30	23.75
35	11.05	11.40	11.75	12.05	12.35	12.70	12.95	13.25	13.50	13.75
50	8.10	8.40	8.70	8.95	9.20	9.45	9.70	9.90	10.10	10.35
60	7.30	7.60	7.85	8.15	8.40	8.65	8.90	9.15	9.35	9.55
70	6.70	7.00	7.30	7.60	7.85	8.15	8.40	8.60	8.85	9.05
85	5.90	6.20	6.45	6.75	7.00	7.25	7.50	7.70	7.95	8.15
95	5.65	5.95	6.25	6.50	6.80	7.05	7.30	7.55	7.75	8.00
110	5.15	5.45	5.75	6.05	6.30	6.55	6.80	7.05	7.25	7.45
130	4.85	5.20	5.50	5.75	6.05	6.30	6.55	6.80	7.05	7.25
150	4.65	5.00	5.30	5.60	5.90	6.15	6.40	6.65	6.90	7.15
170	4.45	4.80	5.10	5.40	5.65	5.95	6.20	6.45	6.70	6.90
185	4.35	4.65	4.95	5.25	5.55	5.80	6.10	6.35	6.55	6.80
195	4.25	4.55	4.85	5.15	5.45	5.75	6.00	6.25	6.50	6.70
215	4.15	4.45	4.75	5.05	5.35	5.65	5.90	6.15	6.40	6.60
250	4.00	4.35	4.70	5.00	5.30	5.55	5.85	6.10	6.35	6.60
305	3.90	4.25	4.60	4.90	5.20	5.50	5.75	6.05	6.30	6.55
330	3.85	4.20	4.50	4.85	5.15	5.45	5.75	6.00	6.25	6.50

1/ DISTANCE LOGS ACTUALLY TRAVEL FROM CHOKER SETTING POINT TO LANDING.  
2/ FOR DISTANCES EXCEEDING 1,000', ADD \$0.25 FOR EACH ADDITIONAL 100' OF YARDING DISTANCE.

BASIC DATA, APPENDIX 1, PAGES 172, 173, 264 THRU 266



9333.3 - PRODUCTION COSTS  
(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 36

LOADING - COMMERCIAL THINNINGS  
WESTERN OREGON

(Using Ramey - Model M as a cold deck loader)

Costs in Dollars per MBF Gross Volume Loaded

16-Foot Log Volume in Bd. Ft. Scribner	
10	\$35.45
20	18.55
40	10.30
50	8.40
60	7.25
70	6.45
90	5.45
100	5.05
110	4.65
120	4.55
130	4.20
140	4.10
150	3.85
160	3.75
170	3.55
190	3.50
200	3.35
210	3.25
220	3.15
230	3.10
240	3.05
260	2.90
280	2.85
290	2.80
300	2.70
330	2.60

Basic Data, Appendix 1, Pages 174, 175, 267, & 268

9333.3 - PRODUCTION COSTS  
(Schedule 19)

RIGGING, YARDING AND LOADING

TABLE 37

COMMERCIAL THINNINGS - RIGGING  
WESTERN OREGON

Includes: 2 light crawler tractors- D4D  
Light loader - Ramey Model M  
2 tractor operators (yarding crew)  
2 man loading crew

First Landing \$163

Additional Landings \$64 (each)

Includes: 2 4-wheel rubber tired skidders - John Deere 440B  
Light loader - Ramey Model M  
2 skidder operators (yarding crew)  
2 man loading crew

First Landing \$190

Additional Landings \$70 (each)

If landings are more than 1/2 mile apart, allow \$35.00 for each additional 1/4 mile.

Basic Data, Appendix 1, Pages 176 thru 183



Transportation





9333.3 - PRODUCTION COSTS

(Schedule 19)

TRANSPORTATION

TABLE 1

LOG TRUCK HAULING RATES

(Truck -  
White - Model 4964W0 with Peerless Trailer)

Straight Time           \$21.65/hour  
                              .361/minute

\*Overtime               \$24.60/hour  
                              .410/minute

Delay Cost               \$12.42/hour  
                              .207/minute

\* Overtime rate is straight time plus 50% increase in driver's  
wage rate.

Basic Data, Appendix 1, Pages 184 thru 187





9333.3 - PRODUCTION COSTS  
(Schedule 19)

TRANSPORTATION

TABLE 2

"EXAMPLE" - HAULING COST COMPUTATION

A. Standard Method - Clocked round trip time includes observed delay time. Hauling cost per MBF net volume is derived from the total gross volume hailed per day.

Maximum day (12 hours) -	720 min.
Minus 30 minutes fixed delay time (for engine warmup, truck servicing and fueling) -	- 30 min.
Net available operating time -	690 min.

Total mean time/round trip (includes observed delays) -	210 RTM
---	---------

Maximum number of trips per day:	
690 min. ÷ 210 total mean RTM = 3.29 trips	
Complete round trips 3.0 @ 210 RTM each -	630 min.
Minus 7-1/2 hours straight time -	-450 min.
Operating overtime -	180 min.

Costing time:	
450 minutes	
+ 30 minutes fixed delay time	
480 minutes x \$0.361 /min. straight time <sup>1/</sup> -	\$173.28
180 minutes overtime x \$0.410 minute <sup>1/</sup> -	73.80
Total hauling cost, 3 loads -	\$247.08

No. loads/day 3.0 x 5.000 M bd. ft./gross load =  
15.000 M, total gross volume hauled per day  
Total hauling cost/day \$247.08 ÷ 15.000 M gross  
volume = \$16.47/M gross volume hauled

(M total net volume) <sup>2/</sup>	
3,213	
<hr/> 3,570	= 0.90 log scale recovery (decimal fraction)

(M tot. gr. merch. vol.) <sup>2/3/</sup>

Truck haul unit cost = \$16.47/M gross volume ÷ 0.90  
log scale recovery = \$18.30/M net merch. volume

9333.3 - PRODUCTION COSTS  
(Schedule 19)

TRANSPORTATION

TABLE 2 (Cont')

B. Alternate Method. The appraiser calculates the maximum number of full round trips (including all delay times) that could be made during a 12-hour day. No fractional trips are considered.

Given an estimated log weight of 10.0 pounds per bd. ft., cruise date indicating a 90 percent log scale recovery, a net volume of 4.500 MBF per load (from Table 5) and a clocked round trip time of 170 minutes obtained from altimeter and odometer readings:

Clocked round trip time -	170 min.
Allowance for "operating" delays	<del>170</del> 40 min.
Total time per round trip -	210 min.

Maximum day (12 hours) <sup>1/</sup> -	720 min.
Minus 30 minutes fixed delay time	- 30 min.
Net available operating time -	690 min.

Maximum number of trips per day:

690 minutes	210 minutes/round trip = 3.29 trips	
Complete round trips - 3.0 @ 210 min. ea. =		630 min.
Minus 7-1/2 hours straight time (1/2 hr. straight time spent in fixed delay) =		-450 min.
Operating overtime -		180 min.

Costing straight time:

450 minutes	
+ 30 minutes fixed delay	
480 minutes x \$0.361/minute <sup>1/</sup>	\$173.28

Costing overtime:

180 minutes x \$0.410/minute <sup>1/</sup>	73.80
Total hauling cost, 3 loads	\$247.08

Total net volume hauled:

3 loads x 4.500 MBF net/load = 13.500 MBF/day

Truck haul unit cost:

\$247.08 ÷ 13.500 MBF = \$18.30/MBF net volume

<sup>1/</sup> From Table 1, Illustration 3

<sup>2/</sup> From timber sale cruise data

<sup>3/</sup> Gross volume after elimination of defect removed in falling and bucking



Road Construction





9333.3 - PRODUCTION COSTS  
(Schedule 19)

ROAD CONSTRUCTION AND MAINTENANCE

TABLE 1

ENGINEERING COSTS  
WESTERN AND EASTERN OREGON

1. Engineering Costs. Engineering costs are not allowed for non-designed roads which require only centerline location and grade established by BLM Allowance for the total job, i.e., survey, design and slope staking is the estimated cost of accomplishing the work or a centerline location previously designated by BLM.

Whenever possible, engineering costs should be obtained from local sources. Reliable contractors capable of performing the required engineering will be contacted and cost allowances applicable to the road being appraised should be discussed and quotes requested for the required work. Several contractors will be contacted (usually no more than three or four) in order to develop reasonable allowances.

When it is not possible to develop reliable allowances from local sources, the following costs may be used as guides in estimating engineering costs.

a. Western Oregon.

(1) Survey and Design.

(a) Survey. Includes P-line traverse, brushing, turning angles, chaining, referencing, running centerline levels and establishing bench marks, cross sectioning, staking and supervision -

\$1,445/mile

Should it be necessary to itemize any of the details included in the total survey cost, the following unit costs are suggested:

P-Line traverse - \$715/mile

P-line profile - 200/mile

Cross sections - 520/mile

(b) Design. Includes design engineering, data processing, computation of quantities and inspection and supervision-  
\$395/mile

(2) Slope Staking.

\$520/mile

(3) Survey, Design and Slope Staking

\$2,270/mile

9333.3 - PRODUCTION COSTS  
(Schedule 19)

ROAD CONSTRUCTION AND MAINTENANCE

TABLE 1 (Cont')

b. Eastern Oregon.

(1) Survey and Design.

(a) Survey.

\$785/mile

Suggested item costs:

P-line survey -	\$385/mile
P-line profile -	140/mile
Cross section -	260/mile

(b) Design.

\$395/mile

(2) Slope Staking.

\$330/mile

(3) Survey, Design and Slope Staking.

\$1,505/mile

c. Miscellaneous Engineering Costs - Western Oregon  
and Eastern Oregon.

(1) Mass Diagram. For balanced designs requiring  
the determination of overhaul quantities -

\$95/mile

(2) Drafting. Includes "hardshell" plotting, plan-  
profile sheets, design sheets and easement plats -

\$165/mile



9333.3 - PRODUCTION COSTS  
(Schedule 19)

ROAD CONSTRUCTION AND MAINTENANCE

TABLE 2

EQUIPMENT MOVE IN <sup>1/</sup>

The basic allowance covers the cost of moving the minimum essential road building equipment from one job to another. A moving distance of 35 miles is considered average. Many loggers presently use two tractors in road construction, one equipped with dozer blade and ripper (without towing winch) and one with dozer blade and towing winch. The latter machine is herein considered a logging tractor; its moving cost is excluded from the road construction move in cost allowance. If it is anticipated that additional equipment (wheel scraper, shovel, roller, dump truck, loader) will be used, the basic road construction move in allowance must be increased accordingly.

Basic Road Construction Move In - \$870.00

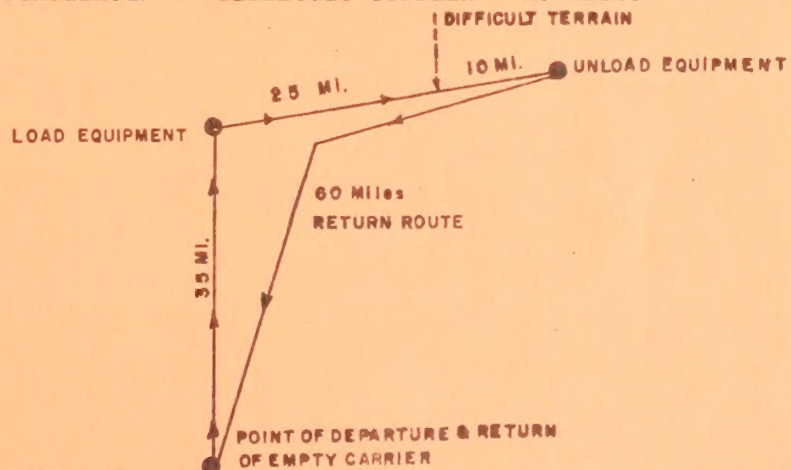
Includes:	Tractor Mounted Dozer D8H	-	Separate Move-in at	-	\$650.00
	Compressor and Track Drill	-	"	"	\$160.00
	Motor Grader	-	"	"	\$ 55.00

Additional Equipment:	Wheel Scraper	\$	280.00
	3/4 Yard Shovel		325.00
	Grid Roller		230.00
	Vibratory Roller		135.00
	Dump Truck		60.00
	Light (Misc.) Tractor		180.00
	Front End (Bucket)		
	Loader, Rubber-tired		70.00

1/ Move in costs were computed for these conditions:

- (1) The equipment will be actually moved 35 miles
- (2) The empty truck rate is allowed for 60 miles
- (3) Travel over mountainous or difficult terrain - 10 miles

An example is:



The additional empty distance is used because many small communities which furnish manpower for logging do not have commercial hauling equipment capable of handling cats, etc. These have to be obtained from sources farther away.

9333.3 - PRODUCTION COSTS  
(Schedule 19)

ROAD CONSTRUCTION AND MAINTENANCE

TABLE 3

CLEARING AND GRUBBING

GRUBBING COSTS

<u>D.B.H.</u>	<u>Cost in Dollars per Stump</u>
24	\$ 6.30
28	7.90
32	9.60
36	12.65
40	15.75
44	18.85
48	21.95
52	25.05
56	28.15
60	31.30
64	34.40
68	37.50
72	40.60
76	43.70
80	46.85
84	49.90
88	53.05
92	56.15
96	59.25
100	62.40

CLEARING COST

Total cost of clearing per surface acre - \$438.00

Basic Data, Appendix 1, Pages 210, 211 & 269



9333.3 - PRODUCTION COSTS  
(Schedule 19)

ROAD CONSTRUCTION AND MAINTENANCE

TABLE 4

EXCAVATION COSTS PER CUBIC YARD 1/

COMMON EXCAVATION

Weighted average cost, all studies - \$0.15 per yard

1/ See Tables 9 and 10 for drift cost adjustments and end haul costs.

Basic data, Appendix 1, Pages 270 & 271

ROCK EXCAVATION

Weighted average cost, all studies, all side slopes - \$1.27/yd.

Basic data, Appendix 1, Pages 272 & 273

9333.3 - PRODUCTION COSTS  
(Schedule 19)

ROAD CONSTRUCTION AND MAINTENANCE

TABLE 5

EXCAVATION COST PER STATION  
14 FOOT SUBGRADE (10 FOOT USABLE WIDTH)

% Side Slope	COMMON EXCAVATION			ROCK EXCAVATION		
	Cost/ Station	Avg. Cut at Center Line-Ft.	Avg.Cu. Yards/ Station	Cost/ Station	Avg. Cut at Center Line-Ft.	Avg.Cu. Yards/ Station
0	\$14.35	1.0	93	\$ 81.50	1.0	64
10	14.35	1.0	93	81.50	1.0	64
20	22.70	1.5	147	109.65	1.0	86
30	34.00	2.0	220	122.25	1.5	96
40	49.55	2.7	321	247.15	2.3	194
50	57.15	2.7	370	341.55	2.6	263
60	74.85	4.3	485	500.75	4.2	393
70	96.10	5.0	622	602.70	4.9	473
80	117.85	5.7	763	725.10	5.7	569
90	140.05	6.3	907	813.00	6.2	638
100	175.00	7.0	1133	936.55	7.0	735

Basic data, Appendix 1, Pages 270 thru 273



9333.3 - PRODUCTION COSTS  
(Schedule 19)

ROAD CONSTRUCTION AND MAINTENANCE

TABLE 6

EXCAVATION COSTS PER STATION  
20 FOOT SUBGRADE (12 FOOT USABLE WIDTH)

% Side Slope	COMMON EXCAVATION			ROCK EXCAVATION		
	Cost/ Station	Avg. Cut at Center Line-Ft.	Avg.Cu. Yards/ Station	Cost/ Station	Avg. Cut at Center Line-Ft.	Avg.Cu. Yards/ Station
0	\$ 20.10	1.2	130	\$ 96.55	0.7	74
10	20.10	1.2	130	96.55	0.7	74
20	47.75	2.5	309	151.65	1.0	119
30	53.45	2.5	346	262.55	1.5	206
40	71.40	3.0	462	351.75	2.0	276
50	95.30	4.3	617	648.60	4.3	509
60	118.70	5.0	768	760.80	5.0	597
70	168.00	7.0	1088	1097.15	7.0	861
80	205.50	8.0	1331	1261.55	8.0	990
90	252.70	9.0	1636	1503.65	9.0	1180
100	315.90	10.0	2045	1701.20	10.0	1335

Basic data, Appendix 1, Pages 270 thru 273

9333.3 - PRODUCTION COSTS  
(Schedule 19)

ROAD CONSTRUCTION AND MAINTENANCE

TABLE 7

EXCAVATION COSTS PER TURNOUT  
14 FOOT SUBGRADE (10 FOOT USABLE WIDTH) 1/

% Side Slope	COMMON EXCAVATION			ROCK EXCAVATION		
	Cost/ Turnout	Avg. Cut at Center Line-Ft.	Avg.Cu. Yards/ Turnout	Cost/ Turnout	Avg. Cut at Center Line-Ft.	Avg.Cu. Yards/ Turnout
0	\$ 4.40	1.3	28	\$ 33.20	1.3	26
10	4.40	1.3	28	33.20	1.3	26
20	5.00	2.0	32	67.50	2.0	53
30	7.60	2.7	49	128.70	2.8	101
40	8.20	3.5	53	90.45	3.5	71
50	13.30	4.7	86	135.10	4.7	106
60	48.00	8.0	311	324.90	8.0	255
70	104.05	12.0	674	648.60	12.0	509
80	127.00	13.2	822	749.30	13.8	588
90	159.45	14.8	1032	894.50	15.0	702
100	192.35	17.0	1245	1057.65	17.0	830

1/ Standard lengths: 50 foot turnout plus two 25 foot approaches.

Basic data, Appendix 1, Pages 270 thru 273



9333.3 - PRODUCTION COSTS  
(Schedule 19)

ROAD CONSTRUCTION AND MAINTENANCE

TABLE 8

EXCAVATION COSTS PER TURNOUT  
20 FOOT SUBGRADE (12 FOOT USABLE WIDTH) 1/

% Side Slope	COMMON EXCAVATION			ROCK EXCAVATION		
	Cost/ Turnout	Avg. Cut at Center Line-Ft.	Avg.Cu. Yards/ Turnout	Cost/ Turnout	Avg. Cut at Center Line-Ft.	Avg.Cu. Yards/ Turnout
0	11.90	1.7	77	159.20	1.0	125
10	11.90	1.7	77	159.20	1.0	125
20	16.05	3.0	104	233.20	2.5	183
30	18.40	3.1	119	243.40	3.1	191
40	31.95	4.0	207	304.58	4.0	239
50	32.90	5.7	213	266.35	5.6	209
60	163.60	10.1	1059	1111.15	10.1	872
70	265.40	14.0	1718	1673.10	14.0	1313
80	332.65	16.0	2154	2038.85	16.0	1600
90	410.10	18.0	2655	2288.70	18.0	1796
100	483.05	20.0	3128	2674.20	20.0	2099

1/ Standard lengths: 100 foot turnout plus two 50 foot approaches.

Basic data, Appendix 1, Pages 270 thru 273

9333.3 - PRODUCTION COSTS  
(Schedule 19)

ROAD CONSTRUCTION AND MAINTENANCE

TABLE 9

ALLOWANCE FOR DRIFT BEYOND 100 FEET

<u>Average Drift Distance in Feet 1/</u>	<u>Cost Increase in Per Cent 2/</u>	<u>Adjusted Cost 3/ per Cubic Yard</u>
100	0	\$0.15
150	42	0.21
200	79	0.27
250	127	0.36
300	178	0.43
350	213	0.49

1/ Distance from mass center of cut to mass center of fill.

2/ These percentages apply only to tractor cost and not to drilling, blasting or explosive costs.

3/ With basic common excavation cost of \$0.15 per yard.

Basic data , Pages 270 and 273.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

ROAD CONSTRUCTION AND MAINTENANCE

TABLE 10

EXCAVATION AND END HAUL COSTS <sup>1/</sup>

Wheel Tractor Hauling Unit (scraper) and Pusher Tractor

<u>Length of Haul in Feet</u>	<u>Cost per Cubic Yard</u>
500	\$ 0.52
1000	0.67
1500	0.80
2000	0.94
2500	1.07

1/ Allow wheel scraper move in cost when using this table.

Basic data, Appendix 1, Pages 212, 213, 274 & 275

9333.3 - PRODUCTION COSTS  
(Schedule 19)

ROAD CONSTRUCTION AND MAINTENANCE

TABLE 11

SHOVEL EXCAVATION COSTS 1/

<u>Type of Material</u>	<u>Cost per Cubic Yard</u>
Easy Digging (common earth - no rocks or roots) -	\$0.50
Rock, Well Blasted -	0.72
Common Excavation (with rocks and roots intermingled) -	0.85
Rock, Poorly Blasted -	1.33

1/ Allow 3/4 yard shovel move in cost when using this table. Shovel excavation will normally be used only in problem areas.

Basic data, Appendix 1 , Pages 214, 215 & 276



9333.3 - PRODUCTION COSTS  
(Schedule 19)

ROAD CONSTRUCTION AND MAINTENANCE

TABLE 12

SHOVEL LOADING - BANK TO TRUCK 1/

<u>Material</u>	<u>Cost per Loose Cubic Yard - on Truck 2/</u>
Bank run (material in place)	\$0.44

1/ Allow 3/4 yard shovel move in and dump truck move in costs when using this table.

2/ Cost is adjusted for swell from bank cubic yards to loose cubic yards.

Basic data, Appendix 1, Pages 216 & 217

9333.3 - PRODUCTION COSTS  
(Schedule 19)

ROAD CONSTRUCTION AND MAINTENANCE

TABLE 13

RIVETED AND HELICALLY CORRUGATED ROUND PIPE

Diameter Inches	Sq. Ft.	Gage	Installed Cost per Foot 1/	Wood Strutting Cost Per Foot	Wire Strutting Cost Per Foot	Beveling Cost Both Ends of Pipe
8	0.3	16	\$ 2.29	\$ --	\$ --	\$ --
10	0.5	16	2.87	--	--	--
12	0.8	16	3.79	--	--	--
15	1.2	16	4.68	--	--	--
18	1.8	16	5.52	--	--	--
21	2.4	16	6.46	--	--	--
24	3.1	14	8.41	--	--	--
30	4.9	14	10.67	--	--	--
36	7.1	12	17.39	--	--	10.50
42	9.6	12	22.42	--	--	12.50
48	12.6	12	25.81	1.73	1.48	13.50
54	15.9	12	31.95	1.89	1.48	15.50
60	19.6	10	42.00	2.00	1.48	16.50
66	23.8	10	46.88	2.16	1.48	19.00
72	28.3	10	52.02	2.27	1.48	21.00
78	33.2	8	67.14	2.43	1.48	23.00
84	38.5	8	73.47	2.54	1.48	24.50
90	44.2	8	79.62	2.70	1.48	26.50
96	50.3	8	86.28	2.81	1.48	28.50

1/ Strutting and beveling costs not included.

Basic data, Appendix 1, Pages 277 thru 281



9333.3 - PRODUCTION COSTS  
(Schedule 19)

ROAD CONSTRUCTION AND MAINTENANCE

TABLE 14

STANDARD RIVETED PIPE ARCH

Size Inches	Area Sq. Ft.	Gage	Installed Cost Per Foot
17 x 13	1.1	16	4.64
21 x 15	1.6	16	5.46
24 x 18	2.2	16	6.37
28 x 20	2.8	14	8.49
35 x 24	4.4	14	10.39
42 x 29	6.4	12	16.06
49 x 33	8.7	12	20.92
57 x 38	11.4	12	24.60
64 x 45	14.3	12	30.34
71 x 47	17.6	10	38.95

Basic data, Appendix 1, Pages 277 thru 281

9333.3 - PRODUCTION COSTS  
(Schedule 19)

ROAD CONSTRUCTION AND MAINTENANCE

TABLE 15

STRUCTURAL PLATE ROUND PIPE

Diameter Feet	Sq. Ft.	Gage	Installed Cost Per Foot <u>1/</u>	Wood Strutting Cost Per Foot	Beveling Cost Per Culvert
8	50.3	12	\$106.90	\$5.40	\$116.50
9	63.6	10	130.00	6.00	131.50
10	78.5	10	145.40	6.60	146.00
11	95.0	10	174.70	7.15	161.00
12	113.0	10	194.30	7.70	180.50

1/ Strutting and beveling costs not included.

Basic data, Appendix 1 , Pages 277 thru 281



9333.3 - PRODUCTION COSTS  
(Schedule 19)

ROAD CONSTRUCTION AND MAINTENANCE

TABLE 16

STRUCTURAL PLATE PIPE ARCH

Size	Area Sq. Ft.	Gage	Installed Cost Per Foot <sup>1/</sup>	Wood Strutting Cost Per Foot	Beveling Cost Per Culvert
6'1" x 4'7"	22	12	\$ 70.00	\$1.95	\$ 81.00
6'9" x 4'11"	26	12	75.14	2.00	87.50
7'3" x 5'3"	31	10	90.00	2.10	95.00
7'11" x 5'7"	35	10	99.07	2.15	102.50
8'7" x 5'11"	40	10	112.18	2.25	109.00
9'4" x 6'3"	46	10	118.35	2.30	116.50
9'9" x 6'7"	52	10	125.90	2.45	124.00
10'8" x 6'11"	58	8	141.56	2.55	131.50
11'5" x 7'3"	64	8	149.21	2.60	138.00
11'10" x 7'7"	71	8	161.83	2.70	146.00
12'4" x 7'9"	74	8	166.99	2.75	150.00
13'11" x 8'7"	93	7	193.40	3.10	168.50

<sup>1/</sup> Strutting and beveling costs not included.

Basic data, Appendix 1, Pages 277 thru 281

9333.3 - PRODUCTION COSTS  
(Schedule 19)

ROAD CONSTRUCTION AND MAINTENANCE

TABLE 17

COST OF PERFORATED CULVERT PIPE

<u>Size</u>	<u>Gage</u>	<u>Installed Cost Per Foot</u>
8"	16	\$4.50



9333.3 - PRODUCTION COSTS  
(Schedule 19)

ROAD CONSTRUCTION AND MAINTENANCE

TABLE 18

GRADING (Per 100' Station)

This is based on the use of a motor grader and the time required for finishing the subgrade and pulling the ditch or subgrades up to 20 feet in width, exclusive of ditch.

Grading cost per 100 foot station - \$5.35

Basic data, Appendix 1 , Pages 218 & 219

9333.3 - PRODUCTION COSTS  
(Schedule 19)

ROAD CONSTRUCTION AND MAINTENANCE

TABLE 19

Surfacing Costs

1. Rock

A. Purchased Rock. Cost estimates for commercially produced crushed rock shall be obtained from local sources. Reliable contractors producing appropriate grade and type of rock in quantities required shall be contacted and price quotes requested specific to the road being appraised. Several contractors should be contacted in order to develop reasonable allowances. The "total job" quote, i.e., cost of rock in place, should be obtained whenever possible. If a "total job" quote cannot be obtained, additional costs such as hauling, spreading, etc., should be obtained from other independent local contractors; from following cost tables; or calculated for the specific road using operating cost data from the appendix.

B. Operator Produced Rock. Cost estimates for this approach are used only when it is not possible or feasible to purchase rock from local supplies. The approach requires specialized experience and knowledge in crushing practices and equipment and quarry development. A definite site for each rock production quarry is required when using this approach.

C. Pit and Bar Run Rock. Cost estimates for this type of material should be developed for the specific road using local equipment rental rates and production rates. When applicable the appraiser may use the following shovel loading cost table.

Pit and Bar Run (cost of shovel loading) $\frac{1}{-}$	\$0.43/cu. yd.
2. <u>Loading</u> (from stockpile) $\frac{2}{-}$	\$0.20/cu. yd.
3. <u>Hauling Rock</u> $\frac{3}{-}$	
First mile or fraction thereof	\$0.95/cu. yd.
Each additional mile beyond first mile	\$0.40/cu. yd.
4. <u>Spreading Rock</u> (cost per life) $\frac{4}{-}$	\$1.27/Station
5. <u>Rolling Rock</u> $\frac{5}{6}$	
Vibratory roller and crawler tractor	\$36.90/hr.
Vibratory roller and rubber tired tractor	\$35.75/hr.
Grid roller and crawler tractor	\$33.15/hr.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

ROAD CONSTRUCTION AND MAINTENANCE

TABLE 19 (cont')

6. Watering<sup>7/</sup> \$4.30 to \$4.90 /1000 gal. unit

1/ Based on FHA rental rate of 3/4 cu. yd. power shovel - add appropriate move in costs for shovel. Dump truck costs not included.

2/ Based on ownership rate of front end loader. Dump truck costs not included.

3/ Based on FHA rental rate for normal size 10 cu. yd. (Struck measure) dump truck primarily for small operations. Costs will be significantly less for large hauling shows which would provide for more efficient loading and hauling of larger trucks.

4/ Based on ownership rate of Motor Grader - add appropriate move in costs, unless previously allowed under construction equipment move in.

5/ Based on FHA rental rate for rollers and ownership rates for motive power units - add appropriate move in costs for rollers and power units if not previously allowed.

6/ Suggested production rate is 100 cu. yd. per hour of rolling. Appraiser should judge each situation individually and estimate accordingly.

7/ Usual range is 45 to 55 gallons per cu. yd. Appraiser should judge each situation individually and estimate accordingly.

Basic data, Appendix<sup>1</sup>, Pages 218A, 220 thru 227.

9333.3 - PRODUCTION COSTS  
(Schedule 19)

ROAD CONSTRUCTION AND MAINTENANCE

TABLE 20

ROAD MAINTENANCE (BLACKTOP, GRAVEL AND  
UNSURFACED ROADS)

This consists of surface blading, ditch pulling, drainage upkeep and repair, slide removal, roadside brushing, roadside stabilization and gravel replacement costs. Determination of these costs as appraisal allowances should be based on condition surveys of the particular roads to be used.

1. Surfaced Roads Costs. This represents an average cost of Bureau of Public Roads maintenance, including current work. Amortization of surface replacement (wear) costs should be based upon current State Office instructions. Present allowances follow:

a. Blacktop Roads.

Average maintenance -	\$0.090/M	bd. ft./mile
Surface wear -	0.090/M	bd. ft./mile
Total	\$0.180/M	bd. ft./mile

b. Gravel Roads - \$0.07/M to \$0.25/M bd.ft./mile plus appropriate allowance for rock wear.

2. Unsurfaced Roads Costs. This allowance should be sufficient to cover surface blading, ditch and culvert cleaning, slough removal and incidental work. It should not include costs of removal of major slides, heavy brush eradication or other extraordinary work.

a. Unsurfaced Roads - \$0.125/M bd. ft./Mile

3. Extraordinary Costs. Where necessary and practical, allowances may be made for watering both surfaced and unsurfaced roads. When slides of major proportions must be removed, additional costs must be included. Slide removal costs and the costs of eradicating heavy roadside brush should be computed by district personnel on the basis of the best local information currently available.

a. Watering - \$7.00/M gallons



Healy

BUREAU OF LAND MANAGEMENT  
MANUAL SUPPLEMENT  
EUGENE DISTRICT OFFICE  
TRANSMITTAL SHEET

Date: January 13, 1975

Release No: 9-17

---

SUBJECT: 9353.3 - PRODUCTION COST

---

1. Explanation of Material Transmitted: This release provides local information on Road Construction and Maintenance surfacing costs.
2. Material Superseded: Manual pages superseded by this release are listed under "REMOVE" below. No other directives are superseded.
3. Filing Instructions:

REMOVE

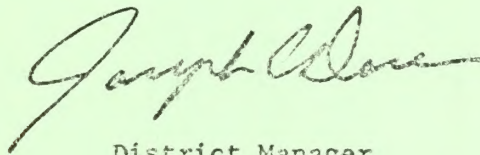
9333.3 Release 9-12

(Total: 1 sheet)

INSERT

9353.3 Release 9-17

(Total: 1 sheet)

  
District Manager

1. The first part of the report is devoted to a general survey of the situation in the country.

2. The second part is devoted to a detailed analysis of the economic situation.

3. The third part is devoted to a detailed analysis of the political situation.

4. The fourth part is devoted to a detailed analysis of the social situation.

5. The fifth part is devoted to a detailed analysis of the cultural situation.

6. The sixth part is devoted to a detailed analysis of the international situation.

7. The seventh part is devoted to a detailed analysis of the military situation.

8. The eighth part is devoted to a detailed analysis of the diplomatic situation.

9. The ninth part is devoted to a detailed analysis of the foreign trade situation.

10. The tenth part is devoted to a detailed analysis of the financial situation.

11. The eleventh part is devoted to a detailed analysis of the tax situation.

12. The twelfth part is devoted to a detailed analysis of the budget situation.

13. The thirteenth part is devoted to a detailed analysis of the public debt situation.

14. The fourteenth part is devoted to a detailed analysis of the currency situation.

15. The fifteenth part is devoted to a detailed analysis of the money market situation.

16. The sixteenth part is devoted to a detailed analysis of the gold market situation.



## 9353.3 - PRODUCTION COSTS

Table 19 - Road Construction and MaintenanceSurfacing Costs1. RockA. Purchased Rock

Crushed river or quarry rock, regardless of size, conforming to specifications 708 and 808: \$1.90/cu.yd.

B. Operator Produced Rock

Develop the cost for each source using the following, applicable items:

- |                          |                  |               |
|--------------------------|------------------|---------------|
| (1) Clearing:            | Machine rates or | \$438/acre    |
| (2) Stripping:           | Machine rates or | \$0.50/cu.yd. |
| (3) Drilling & Shooting: |                  | \$1.10/cu.yd. |
| (4) Production:          |                  | \$1.30/cu.yd. |

Includes all work from feeding the crusher to the finished product in truck or bunker. Reduce by \$0.30 for sandstone.

- |                         |            |
|-------------------------|------------|
| (5) Move-in & Move-out: | \$2,000.00 |
|-------------------------|------------|
- Includes only the crusher and directly related equipment. Reduce by \$750.00 for sandstone.

2. Hauling RockA. Purchased Rock

- |  |                  |
|--|------------------|
| (1) Oil surfaced-well maintained roads:            | \$0.20/cu.yd.mi. |
| (2) Gravel & poorly maintained oil surfaced roads: | \$0.23/cu.yd.mi. |
- No first mile allowance for purchased rock.

B. Operator Produced Rock

- |                           |               |
|---------------------------|---------------|
| (1) First Mile:           | \$0.35/cu.yd. |
| (2) Each additional mile: | \$0.23/cu.yd. |

Note: The above costs were developed from average quotes in the Eugene-Springfield area. Quotes for specific jobs can still be used for unusual situations, but review by District Engineer or District Appraiser is required.





## 9333.3 PRODUCTION COSTS

Table 20 - Road Maintenance (Blacktop, Gravel and Unsurfaced Roads)

1. Surfaced Road Costs. Present allowances for road maintenance and amortization of surface replacement (wear) costs based upon current State Office instructions are as follows:

a. Blacktop Roads

Maintenance Cost	\$0.09/Mbd.ft./Mile
Surface wear	<u>0.09/Mbd.ft./Mile</u>
Total	\$0.18/Mbd.ft./Mile

b. Gravel Roads

Maintenance Cost	\$0.125/Mbd.ft./Mile
Rockwear	0.11 /Mbd.ft./Mile
Total	\$0.235/Mbd.ft./Mile

The surface wear or rockwear fee will be paid to the Government when an allowance is made for operator maintenance except that no wear fee will be allowed for surfacing or re-surfacing projects.

A maintenance cost allowance will be made in the appraisal for any new construction for normal road maintenance during the period that the purchaser has the maintenance responsibility. The maintenance allowance is not to duplicate any items specifically covered elsewhere or those items covered by risk.







UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT

MANUAL TRANSMITTAL SHEET

Release  
9-14

Date  
6/22/73

Subject

9113.7 MAINTENANCE

1. Explanation of Material Transmitted: This release replaces release 9-11 and updates BLM-USFS License Agreement maintenance rates for F.Y. 1974.
2. Reports Required: None.
3. Material Superseded: Manual pages superseded by this release are listed under "REMOVE" below. No other directives are superseded.
4. Filing Instructions: After the attached sheet has been filed as directed, this transmittal sheet may be discarded.

REMOVE

Pages 1-8, Release No. 9-11  
(7/1/72)

INSERT

Release No. 9-14

*James E. Hart*

Acting





## 9113.7 MAINTENANCE

Table of Contents

## .71 Responsibility

C. Timber Sale Responsibility

1. Normal Logging Traffic
2. One-Way Use of a Road
3. Rock Hauling
4. Snow Removal
5. Maintenance Method - FHWA or TSOM
6. Logging Damage
7. Storm Maintenance

Illustrations

1. Schedule of Maintenance Fees
2. Asphalt Surfaced Roads in Eugene District
3. BLM-FS License Agreement Maintenance Rates





## 9113.7 MAINTENANCE

9113.7 Road Maintenance.71 Responsibility

C. Timber Sale Responsibility. Following are the district procedures for charging of road maintenance and rockwear fees for use of BLM roads.

1. Normal Logging Traffic. For normal logging traffic, using one route for all hauling, truck return, and related traffic, fees shall be charged as set out in the attached schedule. For all roads surfaced with crushed aggregate, the maintenance fee shall include a rockwear fee. For bituminous surfaced roads, listed in the attached schedule, a black-top wear fee shall be charged in lieu of a rockwear fee.

In some cases, the normal maintenance allowance is not appropriate for the amount of work involved. Usually such cases involve a relatively small amount of timber using several miles of road. In such cases an allowance should be based upon the actual cost of the work required.

If a licensee or permittee is required to perform the maintenance on a road having crushed rock surface, he will be required to contribute the applicable rockwear fee to the United States. A licensee being required to resurface a BLM road will not be required to pay a rockwear fee for the affected portion of the road. However, a rockwear fee will be charged on any additional miles of road used.

2. One-Way Use of a Road. When trucks are making use of a BLM road as one way route, whether loaded or empty, charge fee as listed in the attached schedule. Use of all roads in connection with BLM sales must be authorized under the terms of the timber sale contract. This may require a contract modification.

The fees for one-way use are based on 60% for the loaded portion and 40% for the empty portion. Fees for the empty truck one-way use are on a per/mile basis for road being used.

3. Rock Hauling. When rock is being hauled to roads on adjacent or intermingled private lands, charge a maintenance fee unless the other party has a policy of not charging the United States a road amortization or maintenance fee for this type of use on their roads. When the rock is for BLM or Forest Service roads but the rock is through-hauled over roads for which the hauler is not responsible for road maintenance, a fee will be charged unless the policy is that forest products will bear the maintenance costs.

4. Snow Removal. At the present time, the policy is that FHWA crew will remove snow from bituminous-surfaced roads as a normal maintenance function when snow depth is not excessive or the snow too established for removal with a motor grader.

When an operator desires to use a FHWA maintained rock-surfaced road during a period when snow is a problem, upon operator's request we will plow the snow if it is felt that normal logging traffic will not harm the road.





## 9113.7 MAINTENANCE

## 4. Snow Removal (Cont'd)

On roads where the licensee or permittee is responsible for maintenance, considerable care must be exercised to prevent damage to the road. Based on a post-operative field inspection of the subject road or segment, the operator is responsible for any damage to the road created by his snow removal operations.

5. Maintenance Method - FHWA or TSOM. District roads on which FHWA maintenance is desired will be listed on the yearly operational maintenance plan. A monthly work request will be submitted to each FHWA foreman with requests for any special work needed or plans for forthcoming road use. These should be quite specific since the FHWA cannot anticipate our plans for road use and must schedule their work in advance.

Care should be taken to see that the timber sale operator, whether obligated for maintenance of a road or required to construct a road, shall leave the road in a condition that will not require an excessive amount of work from a FHWA crew to restore it to an economically maintainable condition.

Section 16 of the Standard Contract provisions states the purchasers liability to maintain and repair roads from wear or damage, but excepts damage caused by major catastrophies, disasters, or third party users. The interpretation of this section makes it necessary to treat each situation on a case by case basis as they arise.

6. Logging Damage. Logging damage is that damage caused to a road prism by logging activities other than the deterioration from normal vehicular use. Some examples would be:

- a. Contamination or loss of road surface material or damage to bituminous roadway surfaces.
- b. Logs and debris left in or around drainage facilities, or physical damage to the drainage facility.
- c. Cut slope, ditch line, shoulder or fill slope damage.
- d. Debris left on cut slopes or fill slopes.

Section 12 of the Standard Contract provisions clearly states the liability of an operator for any damage or expense incurred by the Government through the repair of any logging damage. At any time such damage becomes evident the district engineer should be notified. At that time a meeting will be arranged with the operator to point out the damage being done by his operation and explain to him his liability for any repairs necessary.





## 9113.7 MAINTENANCE

6. Logging Damage. (Cont'd)

At the termination of logging activities a second on-the-ground meeting will be arranged between the operator, FHWA maintenance personnel and representatives of the BLM to inspect and discuss the final extent of damages, and give the operator an estimated cost of damage repairs. If the estimate of damage is less than \$1,000 and all parties concerned are in agreement with the work requirements and cost estimate, the estimate may be used for billing purposes. In this case no logging-damage account will be established; however, no repair work will be done by the FHWA maintenance crew prior to receipt of the billing amount.

If the damage repair estimate given is not satisfactory to the operator, or if the estimate exceeds the above amount, this figure will not be used for billing. In these cases a separate logging-damage account will be established in the FHWA accounting system for any costs incurred to the Government. FHWA maintenance foreman will keep a log of work done, equipment time and materials used which will be charged to this account. Whenever a logging-damage account is established, all billings must be prepared from the FHWA accounting printout. The procedure for logging-damage billings is set out in State Office instructions.

If road damage is recognized as an inevitable result of the logging operation, appropriate appraisal allowances and contract stipulations should be included.

7. Storm Maintenance. Prior to the heavy rainfall season each area will prepare a storm damage action plan in order to provide organized road patrol coverage of the district's road system. This plan will be coordinated with engineering in order to utilize the FHWA maintenance forces effectively. Authorization to proceed with any storm maintenance will be made by the District Manager.





SCHEDULE OF MAINTENANCE FEES

Road Use	Road Surface	Road Location	Maintenance Fee	Rock Wear Fee	Total Fee
Normal Two-way Logging Traffic	Bituminous	On approved list	\$0.09/M/Mi	\$0.09/M/Mi	\$0.18/M/Mi.
	*Crushed Aggregate	District Wide	0.125/M/Mi.	0.11/M/Mi.	0.235/M/Mi.
	Dirt or Plt Run Rock	District Wide	0.10/M/Mi.	-----	0.10/M/Mi.
Logging Traffic One-Way Use	Bituminous	On approved list	Empty: 0.165/Mi. Loaded: 0.05/M/Mi.	0.165/Mi. 0.05/M/Mi.	0.33/Mi. 0.10/M/Mi.
	*Crushed Aggregate	District Wide	Empty: 0.25/Mi. Loaded: 0.075/M/Mi.	0.22/Mi. 0.07/M/Mi.	0.47/Mi. 0.145/M/Mi.
	Dirt or Plt Run Rock	District Wide	Empty: 0.20/Mi. Loaded: 0.06/M/Mi.	----- ----	0.20/Mi. 0.06/M/Mi.
Rock Hauling	If fee is applicable				0.065/cu. yd./Mi.

\* Includes asphalt surfaced roads not on the approved bituminous road list.

Note

Except for E-142, these fees will also be used for permittees.

The stated rockwear fees will be paid to the Government when an allowance is made for operator maintenance except for surfacing or re-surfacing projects.

The above maintenance and rockwear fees are effective immediately and should be used for all future timber sales except for completed appraisals which are not required to be changed.





## Asphalt Surfaced Roads in the Eugene District for Which the Bituminous Surface Rate Applies Are:

<u>Road Name and Number</u>	<u>Miles</u>	
Greenleaf Creek	16-8-35.1	3.0
Whittaker Creek	18-8-21	4.0
Lower Siuslaw	18-8-34	8.5
Upper Siuslaw	19-7-25	10.7
East Oxbow	19-7-25.1	5.4
West Oxbow	20-7-8.2	3.8
Esmond Creek	19-8-3	6.5
Esmond Lake Road	19-8-21	3.8
Esmond-Roman Nose	19-8-29.1	5.8
Buck Creek	20-6-10.3	0.7
	20-6-10	1.8
	20-6-21.1	3.3
Doe Creek	20-6-11	2.2
Edwards Creek	23-2-7.1	1.5
Jasper Creek	23-3-3	1.4
Martin Creek	22-3-35	1.5
Big River Access	23-3-5.4	17.9
Fawn Peak	23-3-12	4.4
Martin Creek Access	23-1-12	0.7
Clark Creek	23-1-13	9.9
Eagles Rest Access	19-1-33.1	7.0
Blagen Mill	14-2-16	5.9
Blagen-Shotgun Connector	14-2-35	2.9
Seeley Creek	15-1-19.1	2.5
Shotgun Creek	16-1-5	8.7
McGowan Creek	16-2-27	6.2
Dunn Ridge	18-8-28.1	5.3
	19-9-13	1.3
Congdon Creek	15-7-34.1	3.1
Fish Creek	16-7-30	4.2
West Fork Brush Creek	14-1-32	2.4
Martin Ridge	16-2E-36.2	7.2
Horn Butte	19-1E-16	4.0
	19-1E-11	1.8





BLM-FS License Agreement Maintenance Rates

The road maintenance fee schedule to be used by the district in license agreements with the Siuslaw National Forest are listed below. These rates are effective July 1 and are to be used through F.Y. 1974.

<u>Timber Haul</u>	<u>*Cost Per M/Mile</u>	
<u>Aggregate Surfaced Roads</u>	<u>Long Log</u>	<u>Short Log</u>
Maintenance	\$0.15	\$0.13
Surface Rock Replacement	<u>0.15</u>	<u>0.13</u>
Total Fee	\$0.30	\$0.26
<u>Paved Roads</u>		
Maintenance	\$0.10	\$0.09
Surface Rock Replacement	<u>0.10</u>	<u>0.09</u>
Total Fee	\$0.20	\$0.18

\* Based on Net Sale Volume. No charge is made for cull volume.

<u>Rock Haul</u>	<u>Cost Per C.Y. Per Mile</u>
<u>Aggregate Surfaced Roads</u>	
Maintenance	\$0.05
Surface Rock Replacement	<u>0.05</u>
Total Fee	\$0.10
<u>Paved Roads</u>	
Maintenance	\$0.04
Surface Rock Replacement	<u>0.04</u>
Total Fee	\$0.08

The above timber haul rates are to be reduced 20% for cull log sales which are based on gross volume.





other cost allowances





9333.3 - PRODUCTION COSTS  
(Schedule 19)

FIRE PROTECTION AND HAZARD REDUCTION

TABLE 1

FIRE PROTECTION - BY SIZE OF TRACT

Timber Sale Size	With Portable Pump	With Trailer Mounted Pump	With Truck Mounted Pump
Up to 3 MM bd. ft.	\$0.20/M bd.ft.	\$0.25/M bd.ft.	\$0.26/M bd. ft.
3 MM to 8 MM bd. ft.	\$ 585.00 plus \$0.05/M bd.ft.	\$585.00 plus \$0.11/M bd.ft.	\$ 585.00 plus \$0.11/M bd. ft.
8 MM bd. ft. and larger	\$1,608.00	\$2,029.00	\$2,078.00

Basic data, Appendix 1, Pages 228 thru 241

9333.3 - PRODUCTION COSTS  
(Schedule 19)

FIRE PROTECTION AND HAZARD REDUCTION

TABLE 2

FIRE LINE COSTS  
WESTERN OREGON

	<u>Cost per Mile</u>	<u>Cost per Station</u>
Tractor	\$232.10	\$4.40
Hand Trail	\$515.65	\$9.75

Basic data, Appendix 1, Pages 242 thru 245



9333.3 - PRODUCTION COSTS  
(Schedule 19)

FIRE PROTECTION AND HAZARD REDUCTION

TABLE 3

SLASH BURNING  
Western Oregon

A. Cost in Dollars per MBF

Net Volume per Acre MBF	Clear Cut Acres <u>1/</u>									
	10	15	20	25	30	40	60	100	150	200
10	2.62	2.17	1.90	1.72	1.60	1.45	1.30	1.07	.80	.55
15	1.75	1.45	1.27	1.15	1.07	.97	.87	.72	.53	.37
20	1.31	1.09	.95	.86	.80	.73	.65	.54	.40	.28
25	1.05	.87	.76	.69	.64	.58	.52	.43	.32	.22
30	.88	.73	.63	.58	.53	.48	.43	.36	.27	.18
35	.75	.62	.54	.49	.46	.41	.37	.31	.23	.16
40	.66	.54	.48	.43	.40	.36	.33	.27	.20	.14
45	.58	.48	.42	.38	.36	.32	.29	.24	.18	.12
50	.52	.43	.38	.35	.32	.29	.26	.22	.16	.11
60	.44	.36	.32	.29	.27	.24	.22	.18	.13	.09
70	.37	.31	.27	.25	.23	.21	.19	.15	.11	.08
80	.33	.27	.24	.22	.20	.18	.16	.13	.10	.07
90	.29	.24	.21	.19	.18	.16	.14	.12	.09	.06
100	.26	.22	.19	.17	.16	.15	.13	.11	.08	.05

1/ Clear cut acreage to be burned in entire sale area.

Basic data, Appendix 1, Page 282

B. Costs in Dollars per Acre

Clear Cut Acres <u>1/</u>										
10	15	20	25	30	40	60	100	160	200	
26.25	21.75	19.00	17.25	16.00	14.50	13.00	10.75	8.00	5.50	

1/ Clear cut acreage to be burned in entire sale area.

Basic data, Appendix 1, Page 282





9333.3 - PRODUCTION COSTS  
(Schedule 19)

OTHER ALLOWANCES

TABLE 1

FOREST DEVELOPMENT

Where seeding or planting is to be done under terms of the timber sale contract, the following appraisal allowances will be used.

These are based on Bureau of Land Management experience:

- |  |         |
|--|---------|
| 1. Planting Cost per Acre (seedlings not included) | \$70.00 |
| 2. Seedling cost per M                             | 35.00   |





9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON DOUGLAS FIR MANUFACTURING

TABLE 1

WEIGHTS BY MANUFACTURE

<u>Log Grade</u>	<u>Percentage</u>	
	<u>Sawn</u>	<u>Peeled</u>
No. 1 & No. 2 Peeler	70	30
No. 3 & No. 4 (SP) Peeler	60	40
No. 2 Sawlog	50	50
No. 3 Sawlog	85	15
Weighted Totals	60	40

Basic Data, Appendix II, Pages 1 thru 4

9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON DOUGLAS FIR MANUFACTURING

TABLE 2

THINNINGS - DOUGLAS FIR

Milling Cost per MBF	-	\$47.00
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9333.3 - PRODUCTION COSTS

(Schedule 19)

WESTERN OREGON DOUGLAS FIR MANUFACTURING

TABLE 3 (page 1)

DOUGLAS FIR PLYWOOD, LUMBER & CHIP MFG. COSTS PER M APRIL 1974  
WESTERN OREGON - NET LOG SCALE  
SEE PAGE 3 FOR DEFECT COST ADJUSTMENT

LOG DIAM	LOG SCALE	GRADE CODE-1	GRADE CODE-2	GRADE CODE-3	GRADE CODE-4	GRADE CODE-5	GRADE CODE-6
5	6						90.94
6	12						83.90
7	21						77.81
8	31						72.56
9	42						68.05
10	55						64.21
11	70						60.96
12	86					63.82	58.23
13	104					63.68	55.96
14	123					63.79	54.09
15	144					64.10	52.58
16	166					64.59	51.37
17	190					65.25	50.44
18	216				76.65	66.03	49.73
19	243				76.59	66.94	49.22
20	272				76.67	67.94	48.88
21	302				76.88	69.02	48.67
22	334				77.21	70.17	48.58
23	368				77.65	71.37	48.58
24	403			78.17	78.17	72.61	48.65
25	440			78.77	78.77	73.88	48.77
26	478			79.43	79.43	75.18	48.93
27	518			80.16	80.16	76.48	49.10
28	559			80.93	80.93	77.79	49.28

APRIL 1974

9333.3 - PRODUCTION COSTS

(Schedule 19)

WESTERN OREGON DOUGLAS FIR MANUFACTURING

TABLE 3 (page 2)

DOUGLAS FIR PLYWOOD, LUMBER & CHIP MFG. COSTS PER M APRIL 1974  
WESTERN OREGON - NET LOG SCALE  
SEE PAGE 3 FOR DEFECT COST ADJUSTMENT

LOG DIAM	LOG SCALE	GRADE CODE-1	GRADE CODE-2	GRADE CODE-3	GRADE CODE-4	GRADE CODE-5	GRADE CODE-6
29	602			81.75	81.75	79.10	49.46
30	647	73.39	73.39	82.61	82.61	80.39	49.62
31	693	74.10	74.10	83.50	83.50	81.67	49.75
32	741	74.81	74.81	84.41	84.41	82.93	49.84
33	790	75.53	75.53	85.35	85.35	84.16	49.89
34	841	76.25	76.25	86.31	86.31	85.36	49.88
35	894	76.96	76.96	87.28	87.28	86.52	49.92
36	948	77.66	77.66	88.27	88.27	87.65	49.69
37	1004	78.35	78.35	89.26	89.26	88.74	49.49
38	1061	79.03	79.03	90.27	90.27	89.77	49.21
39	1120	79.69	79.69	91.29	91.29	90.77	48.85
40	1180	80.32	80.32	92.31	92.31	91.71	48.41
41	1242	81.37	81.37	93.71	93.71	92.90	48.42
42	1306	82.47	82.47	95.18	95.18	94.10	48.42
43	1371	83.63	83.63	96.73	96.73	95.30	48.42
44	1437	84.85	84.85	98.35	98.35	96.51	48.42
45	1506	86.12	86.12	100.04	100.04	97.71	48.42
46	1576	87.45	87.45	101.81	101.81	98.91	48.42
47	1647	88.84	88.84	103.66	103.66	100.11	48.42
48	1720	90.29	90.29	105.59	105.59	101.31	48.42
49	1795	91.80	91.80	107.60	107.60	102.52	48.42
50	1871	93.37	93.37	109.69	109.69	103.72	48.42

COSTS FOR LARGER LOGS REMAIN THE SAME PER MRF

*Same as 43"*

APRIL 1974

Basic Data, Appendix II



9333.3 - PRODUCTION COSTS

(Schedule 19)

WESTERN OREGON DOUGLAS FIR MANUFACTURING

TABLE 3 (page 3)

DOUGLAS-FIR PLYWOOD AND LUMBER MANUFACTURING COSTS  
DEFECT ALLOWANCE

APRIL 1974

WESTERN OREGON

For each one per cent of mill scale defect add the following cost per  
thousand:

LOG GRADE CODE 1	LOG GRADE CODE 2	LOG GRADE CODE 3	LOG GRADE CODE 4	LOG GRADE CODE 5	LOG GRADE CODE 6
\$0.18	\$0.18	\$0.15	\$0.15	\$0.13	\$0.22

Basic Data, Appendix II

9333.3 - PRODUCTION COSTS

(Schedule 19)

WESTERN OREGON DOUGLAS FIR MANUFACTURING

TABLE 4 (page 1)

DOUGLAS FIR LUMBER AND CHIP MFG. COSTS PER M APRIL 1974  
(NET LOG SCALE)  
WESTERN OREGON

LOG DIA	LOG SCALE	100%	MILL SCALE RECOVERY PERCENT				
			90%	80%	70%	60%	50%
5	6	94.33	96.88	99.43	101.98	104.54	107.09
6	12	86.05	88.61	91.16	93.71	96.26	98.81
7	21	78.89	81.44	83.99	86.54	89.09	91.65
8	31	72.71	75.26	77.81	80.36	82.91	85.47
9	42	67.40	69.96	72.51	75.06	77.61	80.16
10	55	62.88	65.44	67.99	70.54	73.09	75.64
11	70	59.06	61.61	64.16	66.71	69.27	71.82
12	86	55.85	58.40	60.95	63.50	66.05	68.61
13	104	53.17	55.73	58.28	60.83	63.38	65.93
14	123	50.98	53.53	56.08	58.63	61.19	63.74
15	144	49.20	51.75	54.30	56.86	59.41	61.96
16	166	47.78	50.34	52.89	55.44	57.99	60.54
17	190	46.68	49.24	51.79	54.34	56.89	59.44
18	216	45.85	48.40	50.96	53.51	56.06	58.61
19	243	45.25	47.81	50.36	52.91	55.46	58.01
20	272	44.85	47.40	49.95	52.51	55.06	57.61
21	302	44.61	47.16	49.71	52.26	54.82	57.37
22	334	44.50	47.05	49.60	52.16	54.71	57.26
23	368	44.50	47.05	49.60	52.16	54.71	57.26
24	403	44.58	47.13	49.68	52.24	54.79	57.34
25	440	44.72	47.28	49.83	52.38	54.93	57.48
26	478	44.91	47.46	50.01	52.56	55.11	57.67
27	518	45.11	47.67	50.22	52.77	55.32	57.87
28	559	45.33	47.88	50.43	52.98	55.54	58.09

APRIL 1974



(Schedule 19)

WESTERN OREGON DOUGLAS FIR MANUFACTURING

TABLE 4 (page 2)

DOUGLAS FIR LUMBER AND CHIP MFG. COSTS PER M APRIL 1974  
(NET LOG SCALE)  
WESTERN OREGON

LOG DIA	LOG SCALE	MILL SCALE RECOVERY PERCENT					
		100%	90%	80%	70%	60%	50%
29	602	45.53	48.09	50.64	53.19	55.74	58.29
30	647	45.72	48.27	50.82	53.38	55.93	58.48
31	693	45.87	48.43	50.98	53.53	56.08	58.63
32	741	45.98	48.54	51.09	53.64	56.19	58.74
33	790	46.04	48.59	51.15	53.70	56.25	58.80
34	841	46.04	48.59	51.14	53.69	56.24	58.80
35	894	45.96	48.51	51.07	53.62	56.17	58.72
36	948	45.81	48.36	50.91	53.47	56.02	58.57
37	1004	45.57	48.13	50.68	53.23	55.78	58.33
38	1061	45.25	47.80	50.35	52.90	55.46	58.01
39	1120	44.83	47.38	49.93	52.48	55.03	57.59
40	1180	44.31	46.86	49.41	51.96	54.51	57.07

COSTS FOR LARGER LOGS REMAIN THE SAME PER MBF

APRIL 1974

Basic Data, Appendix II

9333.3 - PRODUCTION COSTS

(Schedule 19)

WESTERN OREGON DOUGLAS FIR MANUFACTURING

TABLE 5 (page 1)

DOUGLAS FIR PLYWOOD AND CHIP MFG. COSTS  
PER M NET LOG SCALE

APRIL 1974

LOG DIAM	LOG SCALE	GRADE CODE-1	GRADE CODE-2	GRADE CODE-3	GRADE CODE-4	GRADE CODE-5	GRADE CODE-6
5	6						71.72
6	12						71.72
7	21						71.72
8	31						71.72
9	42						71.72
10	55						71.72
11	70						71.72
12	86					71.79	71.72
13	104					74.19	71.72
14	123					75.59	71.72
15	144					79.00	71.72
16	166					81.40	71.72
17	190					83.81	71.72
18	216				122.86	86.21	71.72
19	243				123.59	88.61	71.72
20	272				124.41	91.02	71.72
21	302				125.31	93.42	71.72
22	334				126.30	95.83	71.72
23	368				127.38	98.23	71.72
24	403			128.56	128.56	100.63	71.72
25	440			129.85	129.85	103.04	71.72
26	478			131.24	131.24	105.44	71.72
27	518			132.75	132.75	107.84	71.72
28	559			134.37	134.37	110.25	71.72

APRIL 1974



9333.3 - PRODUCTION COSTS

(Schedule 19)

WESTERN OREGON DOUGLAS FIR MANUFACTURING

TABLE 5 (page 2)

DOUGLAS FIR PLYWOOD AND CHIP MFG. COSTS  
PER M NET LOG SCALE

APRIL 1974

LOG DIAM	LOG SCALE	GRADE CODE-1	GRADE CODE-2	GRADE CODE-3	GRADE CODE-4	GRADE CODE-5	GRADE CODE-6
29	602			136.11	136.11	112.65	71.72
30	647	137.97	137.97	137.97	137.97	115.06	71.72
31	693	139.97	139.97	139.97	139.97	117.46	71.72
32	741	142.09	142.09	142.09	142.09	119.86	71.72
33	790	144.35	144.35	144.35	144.35	122.27	71.72
34	841	146.76	146.76	146.76	146.76	124.67	71.72
35	894	149.31	149.31	149.31	149.31	127.08	71.72
36	948	152.01	152.01	152.01	152.01	129.48	71.72
37	1004	154.86	154.86	154.86	154.86	131.88	71.72
38	1061	157.87	157.87	157.87	157.87	134.29	71.72
39	1120	161.05	161.05	161.05	161.05	136.69	71.72
40	1180	164.39	164.39	164.39	164.39	139.10	71.72
41	1242	167.90	167.90	167.90	167.90	141.50	71.72
42	1306	171.59	171.59	171.59	171.59	143.90	71.72
43	1371	175.46	175.46	175.46	175.46	146.31	71.72
44	1437	179.52	179.52	179.52	179.52	148.71	71.72
45	1506	183.76	183.76	183.76	183.76	151.12	71.72
46	1576	<del>188.19</del>	<del>188.19</del>	<del>188.19</del>	<del>188.19</del>	<del>153.52</del>	<del>71.72</del>
47	1647	<del>192.82</del>	<del>192.82</del>	<del>192.82</del>	<del>192.82</del>	<del>155.92</del>	<del>71.72</del>
48	1720	<del>197.66</del>	<del>197.66</del>	<del>197.66</del>	<del>197.66</del>	<del>158.33</del>	<del>71.72</del>
49	1795	<del>202.70</del>	<del>202.70</del>	<del>202.70</del>	<del>202.70</del>	<del>160.73</del>	<del>71.72</del>
50	1871	<del>207.94</del>	<del>207.94</del>	<del>207.94</del>	<del>207.94</del>	<del>163.14</del>	<del>71.72</del>

COSTS FOR LARGER LOGS REMAIN THE SAME PER MBF

*same as 45"*

APRIL 1974

Basic Data, Appendix II





9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON ASSOCIATED SPECIES MANUFACTURING

TABLE 1

THINNINGS

Hemlock

Milling Cost per MBF ----- \$51.00

True Firs

Milling Cost per MBF ----- \$51.00

9333.3 - PRODUCTION COSTS

(Schedule 19)

WESTERN OREGON ASSOCIATED SPECIES MANUFACTURING

TABLE 2 (page 1)

HEMLOCK		LUMBER AND CHIP MFG. COSTS PER M (NET LOG SCALE) WESTERN OREGON						APRIL 1974
LOG DIA	LOG SCALE	100%	90%	80%	70%	60%	50%	
5	6	97.52	100.07	102.62	105.17	107.73	110.28	
6	12	89.24	91.80	94.35	96.90	99.45	102.00	
7	21	82.08	84.63	87.18	89.73	92.28	94.84	
8	31	75.90	78.45	81.00	83.55	86.10	88.66	
9	42	70.59	73.15	75.70	78.25	80.80	83.35	
10	55	66.07	68.63	71.18	73.73	76.28	78.83	
11	70	62.25	64.80	67.35	69.90	72.46	75.01	
12	86	59.04	61.59	64.14	66.69	69.24	71.80	
13	104	56.36	58.92	61.47	64.02	66.57	69.12	
14	123	54.17	56.72	59.27	61.82	64.38	66.93	
15	144	52.39	54.94	57.49	60.05	62.60	65.15	
16	166	50.97	53.53	56.08	58.63	61.18	63.73	
17	190	49.87	52.43	54.98	57.53	60.08	62.63	
18	216	49.04	51.59	54.15	56.70	59.25	61.80	
19	243	48.44	51.00	53.55	56.10	58.65	61.20	
20	272	48.04	50.59	53.14	55.70	58.25	60.80	
21	302	47.80	50.35	52.90	55.45	58.01	60.56	
22	334	47.69	50.24	52.79	55.35	57.90	60.45	
23	368	47.69	50.24	52.79	55.35	57.90	60.45	
24	403	47.77	50.32	52.87	55.43	57.98	60.53	
25	440	47.91	50.47	53.02	55.57	58.12	60.67	
26	478	48.10	50.65	53.20	55.75	58.30	60.86	
27	518	48.30	50.86	53.41	55.96	58.51	61.06	
28	559	48.52	51.07	53.62	56.17	58.73	61.28	

APRIL 1974



9333.3 - PRODUCTION COSTS

(Schedule 19)

WESTERN OREGON ASSOCIATED SPECIES MANUFACTURING

TABLE 2 (page 2)

HEMLOCK		LUMBER AND CHIP MFG. COSTS PER M (NET LOG SCALE) WESTERN OREGON					APRIL 1974
LOG DIA	LOG SCALE	100%	MILL SCALE RECOVERY PERCENT			60%	50%
			90%	80%	70%		
29	602	48.72	51.28	53.83	56.38	58.93	61.48
30	647	48.91	51.46	54.01	56.57	59.12	61.67
31	693	49.06	51.62	54.17	56.72	59.27	61.82
32	741	49.17	51.73	54.28	56.83	59.38	61.93
33	790	49.23	51.78	54.34	56.89	59.44	61.99
34	841	49.23	51.78	54.33	56.88	59.43	61.99
35	894	49.15	51.70	54.26	56.81	59.36	61.91
36	948	49.00	51.55	54.10	56.66	59.21	61.76
37	1004	48.76	51.32	53.87	56.42	58.97	61.52
38	1061	48.44	50.99	53.54	56.09	58.65	61.20
39	1120	48.02	50.57	53.12	55.67	58.22	60.78
40	1180	47.50	50.05	52.60	55.15	57.70	60.26

COSTS FOR LARGER LOGS REMAIN THE SAME PER MBF

APRIL 1974

Basic Data, Appendix II

9333.3 - PRODUCTION COSTS

(Schedule 19)

WESTERN OREGON ASSOCIATED SPECIES MANUFACTURING

TABLE 3 (page 1)

TRUE FIRS, CEDARS		LUMBER AND CHIP MFG. COSTS PER M (NET LOG SCALE) WESTERN OREGON					APRIL 1974
LOG DIA	LOG SCALE	100%	90%	80%	70%	60%	50%
5	6	99.01	101.57	104.12	106.67	109.22	111.77
6	12	90.74	93.29	95.84	98.40	100.95	103.50
7	21	83.57	86.12	88.68	91.23	93.78	96.33
8	31	77.39	79.94	82.50	85.05	87.60	90.15
9	42	72.09	74.64	77.19	79.75	82.30	84.85
10	55	67.57	70.12	72.67	75.23	77.78	80.33
11	70	63.74	66.30	68.85	71.40	73.95	76.50
12	86	60.53	63.08	65.64	68.19	70.74	73.29
13	104	57.86	60.41	62.96	65.52	68.07	70.62
14	123	55.66	58.22	60.77	63.32	65.87	68.42
15	144	53.89	56.44	58.99	61.54	64.09	66.65
16	166	52.47	55.02	57.57	60.13	62.68	65.23
17	190	51.37	53.92	56.47	59.03	61.58	64.13
18	216	50.54	53.09	55.64	58.20	60.75	63.30
19	243	49.94	52.49	55.04	57.60	60.15	62.70
20	272	49.54	52.09	54.64	57.19	59.74	62.30
21	302	49.29	51.85	54.40	56.95	59.50	62.05
22	334	49.19	51.74	54.29	56.84	59.39	61.95
23	368	49.19	51.74	54.29	56.84	59.39	61.95
24	403	49.27	51.82	54.37	56.92	59.48	62.03
25	440	49.41	51.96	54.51	57.07	59.62	62.17
26	478	49.59	52.14	54.70	57.25	59.80	62.35
27	518	49.80	52.35	54.90	57.46	60.01	62.56
28	559	50.01	52.57	55.12	57.67	60.22	62.77

APRIL 1974



(Schedule 19)

WESTERN OREGON ASSOCIATED SPECIES MANUFACTURINGTABLE 3 (page 2)

TRUE FIRS, CEDARS		LUMBER AND CHIP MFG. COSTS PER M (NET LOG SCALE) WESTERN OREGON					APRIL 1974
LOG DIA	LOG SCALE	100%	90%	80%	70%	60%	50%
29	602	50.22	52.77	55.32	57.88	60.43	62.98
30	647	50.41	52.96	55.51	58.06	60.61	63.17
31	693	50.56	53.11	55.66	58.22	60.77	63.32
32	741	50.67	53.22	55.77	58.33	60.88	63.43
33	790	50.73	53.28	55.83	58.38	60.94	63.49
34	841	50.72	53.27	55.83	58.38	60.93	63.48
35	894	50.65	53.20	55.75	58.30	60.86	63.41
36	948	50.50	53.05	55.60	58.15	60.70	63.26
37	1004	50.26	52.81	55.36	57.92	60.47	63.02
38	1061	49.93	52.49	55.04	57.59	60.14	62.69
39	1120	49.51	52.06	54.62	57.17	59.72	62.27
40	1180	48.99	51.54	54.10	56.65	59.20	61.75

COSTS FOR LARGER LOGS REMAIN THE SAME PER MBF

APRIL 1974

Basic Data, Appendix II





9333.3 - PRODUCTION COSTS

(Schedule 19)

EASTERN AND WESTERN OREGON MANUFACTURING 1/

TABLE 1 (page 1)

PINES AND ASSOCIATED SPECIES APRIL 1974  
LUMBER AND CHIP MANUFACTURING COSTS PER  
NET LOG SCALE

LOG DIA	LOG SCALE	MILL SCALE RECOVERY PERCENT					
		100%	96%	80%	70%	60%	50%
5	6	171.43	177.93	184.44	190.95	197.46	203.97
6	12	150.32	156.83	163.34	169.85	176.36	182.87
7	21	132.04	138.55	145.06	151.57	158.07	164.58
8	31	116.27	122.78	129.29	135.80	142.31	148.82
9	42	102.75	109.26	115.77	122.28	128.79	135.30
10	55	91.22	97.73	104.24	110.75	117.26	123.77
11	70	81.46	87.97	94.48	100.99	107.50	114.01
12	86	73.27	79.78	86.29	92.80	99.31	105.82
13	104	66.46	72.97	79.47	85.98	92.49	99.00
14	123	60.86	67.37	73.88	80.38	86.89	93.40
15	144	56.32	62.83	69.34	75.85	82.36	88.87
16	166	52.71	59.22	65.73	72.24	78.75	85.26
17	190	49.90	56.41	62.92	69.43	75.94	82.45
18	216	47.78	54.29	60.80	67.31	73.82	80.33
19	243	46.26	52.76	59.27	65.78	72.29	78.80
20	272	45.23	51.73	58.24	64.75	71.26	77.77
21	302	44.61	51.12	57.63	64.14	70.65	77.16
22	334	44.34	50.84	57.35	63.86	70.37	76.88
23	368	44.33	50.84	57.35	63.86	70.37	76.88
24	403	44.54	51.05	57.56	64.07	70.58	77.09
25	440	44.90	51.41	57.92	64.43	70.94	77.45
26	478	45.37	51.88	58.39	64.90	71.41	77.92
27	518	45.90	52.41	58.92	65.43	71.94	78.45
28	559	46.45	52.96	59.47	65.98	72.48	78.99

APRIL 1974

9333.3 - PRODUCTION COSTS

(Schedule 19)

EASTERN AND WESTERN OREGON MANUFACTURING 1/

TABLE 1 (page 2)

PINES AND ASSOCIATED SPECIES APRIL 1974  
LUMBER AND CHIP MANUFACTURING COSTS PER  
NET LOG SCALE

LOG DIA	LOG SCALE	MILL SCALE RECOVERY PERCENT					
		100%	90%	80%	70%	60%	50%
29	602	46.97	53.48	59.99	66.50	73.01	79.52
30	647	47.45	53.96	60.47	66.98	73.49	80.00
31	693	47.84	54.35	60.86	67.37	73.88	80.39
32	741	48.12	54.63	61.14	67.65	74.16	80.67
33	790	48.27	54.78	61.29	67.80	74.31	80.82
34	841	48.26	54.77	61.28	67.79	74.29	80.80
35	894	48.17	54.58	61.09	67.59	74.10	80.61
36	948	47.68	54.19	60.70	67.21	73.72	80.23
37	1004	47.08	53.59	60.10	66.61	73.11	79.62
38	1061	46.25	52.76	59.27	65.77	72.26	78.79
39	1120	45.17	51.68	58.19	64.70	71.21	77.72
40	1180	43.85	50.36	56.86	63.37	69.88	76.39

COSTS FOR LARGER LOGS REMAIN THE SAME PER MBF

1/ Oregon Pines and Eastern Oregon Associated Species

APRIL 1974

Basic Data, Appendix II



9333.3 - PRODUCTION COSTS  
(Schedule 19)

EASTERN OREGON MANUFACTURING

TABLE 2

Lodgepole Pine

Manufacturing Cost per MBF (Log Scale)	
(Includes Chips)	- - - - \$53.50
(Excludes Chips)	- - - - - - - - \$50.45











Appendix 1  
Basic Cost Data





APPENDIX 1 - BASIC DATA

TREE TO POND COSTS

Table of Contents

	Page
A. Wage Rates and Manpower	1
1. Data Source . . . . .	1
a. Basic Rate . . . . .	1
b. Adjustment Factors (Western Oregon) . . . . .	1
c. Adjustment Factors (Eastern Oregon) . . . . .	3
2. Hourly Wage Rate (Western Oregon) . . . . .	3A
3. Updated Wage Rate . . . . .	3A
4. Wage Rate Summary - Western Oregon . . . . .	4
5. Wage Rate Summary - Eastern Oregon . . . . .	5
B. Machine Rates . . . . .	6
1. Data Source . . . . .	6
a. Machine Ownership . . . . .	6
b. Machine Rental . . . . .	6
2. Components of Machine Rates . . . . .	7
a. Ownership Rates . . . . .	7
b. Rental Rates . . . . .	9
c. Updating Machine Rates . . . . .	9A
3. Individual Machine Rates . . . . .	10
a. Summary . . . . .	10
b. Operating Costs in Percent . . . . .	11A
c. Rate Computations . . . . .	12
(1) Chain Saw . . . . .	13
(2) Light Yarding Tractor . . . . .	15
(3) Yarding Crawler Tractor . . . . .	17
(4) Rubber-tired Four-wheel Skidder . . . . .	19
(5) Medium Yarder (Rigged Spar Tree) . . . . .	21
(6) Yarder-Portable 65' Tower . . . . .	23
(7) Yarder-Portable 110' Tower . . . . .	25
(8) Static Skyline - Portable 120' Tower . . . . .	27
(9) Mobile Yarder-Loader - Trakloader TL-6. . . . .	29
(10) Light Mobile Loader . . . . .	31
(11) Heavy Mobile Loader TL-98 . . . . .	33
(11A) Heavy Mobile Loader HC-98 . . . . .	33A
(12) Front End Log Loader - Rubber-tired . . . . .	35
(13) Light (Misc. Use) Crawler Tractor . . . . .	37
(14) Tractor Mounted Dozer . . . . .	39
(15) Front End (Bucket) Loader - Rubber-tired . . . . .	41
(16) Air Compressor and Jackhammer Drill . . . . .	43
(17) Air Compressor and Drill (Track Drill) . . . . .	45
(18) Motor Scraper. . . . .	47

9333.3 - PRODUCTION COSTS  
(Schedule 19)

	Page
(19) Shovel (3/4 Yard) . . . . .	49
(20) Dump Truck - Normal Duty . . . . .	51
(21) Road Roller - Vibratory . . . . .	53
(22) Road Roller - Grid. . . . .	55
(23) Motor Grader Caterpillar No. 12F with cab .	57
(23A) Motor Grader with Power Shift . . . . .	59
(24) Log Truck . . . . .	61
(25) Crew Car . . . . .	63
C. Operating Costs . . . . .	65
1. Procedure . . . . .	65
2. Operating Cost Computations . . . . .	65
a. Falling and Bucking . . . . .	66
(1) Merchantable and Unmerchantable Trees and Snags - Western Oregon . . . . .	66
(2) Commercial Thinnings - Western Oregon . . .	68
(3) Unmerchantable Trees and Snags - Eastern Oregon . . . . .	70
b. Rigging, Yarding and Loading . . . . .	72
(1) Equipment Move-in - Western Oregon. . . . .	72
(2) Equipment Move-in - Eastern Oregon. . . . .	94
(3) Tractor Yarding - Western Oregon . . . . .	100
(4) Tractor Loading - Mobile Loader TL-98 . . . .	102
(5) Tractor Loading - Mobile Loader HC-98 - Western Oregon . . . . .	103A
(6) Tractor Yarding - Salvage Pickup - Western Oregon . . . . .	104
(7) Tractor Loading - Salvage Pickup - Western Oregon . . . . .	106
(8) Tractor Rigging - Clear Cut and Partial Cut - Western Oregon . . . . .	108
(9) Tractor Rigging - Salvage Pickup - Western Oregon . . . . .	112
(10) Tractor Yarding - Eastern Oregon . . . . .	116
(11) Tractor Loading - Eastern Oregon . . . . .	118
(12) Tractor Rigging - Eastern Oregon . . . . .	120
(13) Highlead Logging - Western Oregon . . . . .	124
(14) Highlead Yarding - 65' Tower - Western Oregon . . . . .	126
(15) Highlead Yarding - 110' Tower - Western Oregon . . . . .	128
(16) Highlead Loading - Western Oregon . . . . .	130
(17) Highlead Rigging - Medium Yarder - Western Oregon . . . . .	132
(18) Highlead Rigging - 65' Tower - Western Oregon . . . . .	136



9333.3 - PRODUCTION COSTS  
(Schedule 19)

	Page
(19) Highlead Rigging - 110' Tower - Western Oregon . . . . .	140
(20) Skyline Yarding - 120' Portable Tower - Western Oregon . . . . .	144
(21) Skyline Loading - 120' Portable Tower - Western Oregon . . . . .	146
(22) Skyline Rigging - Western Oregon . . . . .	148
(23) Highlead Swinging - Hot and Cold Deck - Western Oregon . . . . .	154
(24) Highlead Swinging - Rigging Cost - Western Oregon . . . . .	156
(25) Cold Deck Loading - TL-98 - Western and Eastern Oregon . . . . .	158
(26) Cold Deck Loading - HC-98 - Western and Eastern Oregon . . . . .	158A
(27) Misc. Small Sale Operations - Light Mobile Loader Loading (Cold Deck)-Western and Eastern Oregon . . . . .	160
(28) Misc. Small Sale Operations - Rigging Costs Western and Eastern Oregon . . . . .	160A
(29) Misc. Small Sale Operations - Yarding by Yarder-Loader - Western Oregon . . . . .	164
(30) Misc. Small Sale Operations - Yarding by Yarder-Loader - Eastern Oregon . . . . .	164A
(31) Misc. Small Sale Operations - Rigging Cost - Western Oregon . . . . .	166
(32) Misc. Small Sale Operations - Rigging Cost - Eastern Oregon . . . . .	166A
(33) Misc. Small Sale Operations - Loading by Yarder-Loader - Western and Eastern Oregon	168
(34) Commercial Thinnings - Yarding with Light Crawler Tractor - Western Oregon . . . . .	170
(35) Commercial Thinnings - Yarding with 4 Wheel Skidder - Western Oregon . . . . .	172
(36) Commercial Thinnings - Loading - Western Oregon . . . . .	174
(37) Commercial Thinnings - Rigging Cost - Western Oregon . . . . .	176
c. Transportation	184
( 1) Truck Hauling - Operating Cost - Western and Eastern Oregon . . . . .	184
( 2) Truck Hauling - Delay Cost - Western and Eastern Oregon . . . . .	186

9333.3 - PRODUCTION COSTS  
(Schedule 19)

	Page
d. Road Construction and Maintenance	188
( 1 ) Equipment Move In . . . . .	188
( 2 ) Clearing - Per Acre . . . . .	210
( 3 ) Excavation and End Haul with Wheel Scraper	212
( 4 ) Excavation with 3/4 C.Y. Shovel . . . . .	214
( 5 ) Shovel Loading - Bank to Truck . . . . .	216
( 6 ) Grading - Per Station . . . . .	218
( 7 ) Surfacing - Loading (from Stockpile) . . .	218A
( 8 ) Spreading - Cost per Station . . . . .	220
( 9 ) Rolling Rock . . . . .	222
e. Fire Protection	228
( 1 ) Equipment Costs . . . . .	228
( 2 ) Cost by Sale Size . . . . .	236
( 3 ) Fire Line Construction - Tractor . . . .	242
( 4 ) Fire Trail Construction - Hand Trail . . .	244
3. Cost and Production Studies	246
a. Falling and Bucking	247
( 1 ) Merchantable Trees - Western Oregon . . . .	247
( 2 ) Unmerchantable Snags and Culls - Western and Eastern Oregon . . . . .	248
( 3 ) Commercial Thinnings - Western Oregon . . .	249
b. Yarding and Loading	251
( 1 ) Operating Time for Tractor Yarding in Western Oregon . . . . .	251
( 2 ) Operating Time for Partial Cut Tractor Yarding Operations - Western Oregon . . . .	253
( 3 ) Operating Time for Tractor Yarding in Eastern Oregon . . . . .	254
( 4 ) Operating Time for High-lead Yarding and Hot Deck Swinging - Western Oregon . . . .	255
( 5 ) Operating Time for Static Skyline Yarding in Clear Cuts (Using Radio controlled sky- car - Western Oregon . . . . .	257
( 6 ) Operating Time for Light Yarder-Loader - Western and Eastern Oregon . . . . .	260
( 7 ) Commercial Thinnings - Yarding with Light Crawler Tractor - Western Oregon . . . . .	261
( 8 ) Commercial Thinnings - Operating Time for Rubber-tired Skidder Yarding - Western Oregon . . . . .	264
( 9 ) Commercial Thinnings - Operating Time for Light Yarder-Loader - Cold Deck Loading . Western Oregon . . . . .	267



9333.3 - PRODUCTION COSTS  
(Schedule 19)

	Page
c. Road Construction	269
( 1) Grubbing . . . . .	269
( 2) Excavation . . . . .	270
( 3) Excavation and End Haul with Wheel Scraper	274
( 4) Shovel Excavation - 3/4 Yard Shovel . . .	276
( 5) Culverts . . . . .	277
d. Fire Protection and Hazard Reduction	282
( 1) Slash Burning . . . . .	282





Wage Rates





9333.3 - PRODUCTION COSTS  
(Schedule 19)Cost And Production StudiesA. Wage Rates and Manpower

1. Data Source.<sup>1/</sup> Wage rate data was obtained from a sample of Oregon Forest Industries, including companies and contractors. In addition, the basis for basic wage rate adjustments was determined from industry-wide information obtained from state and Federal government sources concerned with forest industries labor activities.

a. Basic Rate. Information and basic wage rates were obtained from a statewide inquiry of a representative sample of BLM purchasers in each BLM district. Both union and non-union wage scales were considered. Current rates, i.e., rates effective in September 1972 were used. There are no extensions for anticipated future wage increases or decreases. They are considered current for the existing logging season. Wage rates used for each crew position coincide as closely as possible with named positions from the wage survey. In some instances, when reported crew position descriptions could not be correlated with BLM crew position descriptions, survey rates were not used; for example, if a wage survey listed a cat driver and we could not establish if it pertained to a large or small tractor operator, the reported rate is not included in the cost schedule. An average rate from all survey sources was developed for each crew position required in Schedule 17.

b. Adjustment Factors. (Western Oregon) Basic wage rates are adjusted to a total of 169% according to the following factors to provide for dependent wage costs for use in the schedule.

(1) Workmen's Benefits. The basis for workmen's benefits was obtained from a small sample of companies which furnished this type of data. The level of these benefits are substantially the same as provided for in current union contracts. We did not find any non-union companies which substantially exceeded these benefits. Although Health & Welfare and Pensions were a direct fixed dollar per hour amount for all positions, regardless of wage rate level in previous schedules, the amounts used in Schedule 17 are a percentage of basic rate for each position. This percentage was determined as the relationship of 28¢/hour for health and welfare and 12¢/hour for pensions to the overall average basic rate for all BLM crew positions in Schedule 17. Eight paid holidays and a 13-day paid vacation period was provided. The percentage of basic rate for these two benefits was determined as a relationship of overall average basic rate for all positions to the cost of such benefits. These averaged 19¢/hour for holidays and 32¢/hour for paid vacations. For the purpose of holidays and vacations a 20-day month and 10-month year was assumed for a total of 1600 hours annually.

<sup>1/</sup> Schedule 18



9333.3 - PRODUCTION COSTS  
(Schedule 19)

(2) Direct Supervision. This adjustment factor was increased from the previously used 7% to 10%. The basis for this increase was current cost estimates collected by the Forest Service and Bureau of Indian Affairs as we interpreted that they would apply in this adjustment factor. Further, increased emphasis on environmental considerations on BLM contracts will require additional supervision by contractor's personnel.

(3) Employer Contributions.

(i) Unemployment compensation of 1.34% is based on statewide taxes of the Oregon UI tax of 2.2% of taxable income, which is up to \$4200 annual earnings of each employee for each employer, and Federal FUTA tax of 0.5% of taxable income, which is up to \$4,200 annual earnings for each employee for each employer. Based on information from the State Department of Employment for the logging industry, Oregon U.I. tax rates of 1.26% and Federal FUTA tax rates of 0.2% were provided as appropriate for this cost schedule.

(ii) The Industrial Accident rate as based on average western Oregon logging industry information obtained from the State Industrial Accident Fund Office. The rate was computed from the present manual rate of \$16.57 per \$100.00 payroll - modified by the last four-year experience. Thus, the net average rate for westside logging is 15.36%.

(iii) Social Security tax rate is currently 5.2% for the first \$9,000 annual earnings. The overall average for all crew members in this schedule does not exceed this amount. The full tax rate is provided.

(4) Transportation. This cost item is included under wage rates to simplify the job of computing hourly operation rates. The item includes a travel differential of 35¢/hour for each crew member, except the log truck driver; and an equipment transportation cost of 30¢/hour. The travel differential was found common in the wage survey data. The equipment cost was computed from machine rates in this schedule. The 65¢/hour cost is 13% of the overall average basic rate for all crew positions in Schedule 17.

(5) Call Time. This cost is not accounted for in BLM time studies. It is the cost of non-productive labor delays caused by inclement weather, fire and fire closures. An allowance of 5% of normal basic rates is provided for as "call time".



9333.3 - PRODUCTION COSTS  
(Schedule 19)

c. Adjustment Factors. (Eastern Oregon) Basic wage rates were adjusted according to the following factors to allow for dependent wage costs:

(1) Workmen's Benefits.

(i) Health and welfare	\$0.132
(ii) Paid holidays	0.082
(iii) Paid vacations	0.126
(iv) Pensions	0.122
	<u>\$0.462</u>

(2) Direct Supervision. Seven percent of base wages of crew was used.

(3) Employer's Contributions - Western and Eastern Oregon

(i) Unemployment compensation	1.47%
(ii) Industrial accident	9.67%
(iii) Social security	<u>4.40%</u>
	15.54% of base wages of crew

(4) Transportation. Transportation was included under wage rates to simplify the problem of working up the hourly rate of the different functions. The machine rate for a carryall was computed and divided by an average of seven riders.

(i) \$0.275 per man per hour

(5) Call Time. One element of costs is not accounted for in Bureau of Land Management time studies or other cost allocations. This is the cost of non-productive labor delays occasioned by inclement weather (wind, rain, or snow) and fire. Some delays do not require any additional labor or "call time" costs. An allowance of five percent of normal base wages has been estimated to cover "call time".

9333.3 - PRODUCTION COSTS  
(Schedule 19)

2. Hourly Wage Rate - Western Oregon. The 1972 wage rate survey reported it was more common for logging and road construction crews to work 9-hour days rather than 8-hour days. The ninth daily working hour or the five hours in excess of 40 working hours is usually paid overtime. Thus, this schedule now provides for a basic 9-hour (8 regular time plus one overtime) working day. Even where daily production is based on 8 working hours; wages are allowed in reference to 9-hour days. The overtime for the ninth hour is 1.5 times basic pay level, adjusted for workmen's benefits (except paid holidays and vacations), general supervision, and employer's contributions. There are no allowances for transportation, travel, or call time in overtime rates.

In some localities, notably western Medford District, it was reported common for daily work hours to exceed even more than 9 hours. Although a trend was reported, the survey was not adequate to provide for further general overall adjustment with any degree of reliability. Thus, on an individual sale basis, and when in the judgment of the appraiser a longer or shorter work day is appropriate, adjustments for overtime should be made. The following factors should be used.

<u>Factor</u>	<u>Work Day - Hours</u>
.97	9 - 8
.99	9 - 8½
1.01	9 - 9½
1.02	9 - 10
1.03	9 - 10½
1.04	9 - 11

Care must be exercised to adjust only the manpower allowance in each logging or road construction activity.

3. Updated Wage Rate. Schedule 18 wage rate was increased by a factor of 1.074. The factor was computed from Western Wood Products Association "Employment Summary".

5.254	Oct 1973	12 months average hourly wage	= 1.074
4.493	Aug 1972	(straight time)	



9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. Wage Rate Summary - Western Oregon

<u>Logging Crew</u>	<u>Basic Wage Per Hour</u>	<u>BLM Adjusted Wage Per Hour</u>		<u>Schedule 18 2/ BLM Adjusted Wage Based on 9-Hour Day</u>	
		<u>Straight Time Over Time</u>		<u>Per Hour</u>	<u>Per Minute</u>
Chaser	\$4.42	\$ 7.47	\$ 9.28	\$ 7.67	\$0.128
Choker Setter	4.26	7.20	8.95	7.39	0.123
Drill Operator	4.78	8.08	10.04	8.30	0.138
Dump Truck Operator	4.45	7.52	9.35	7.72	0.129
Faller and Bucker	6.32	10.68	13.27	10.97	0.183
Grader Operator	4.75	8.03	9.98	8.25	0.138
Head Rigger	5.10	8.62	10.71	8.85	0.148
Hook Tender	5.56	9.40	11.68	9.65	0.161
Laborer	3.93	6.64	8.26	6.82	0.114
Loading Engineer (Grapple)	5.37	9.08	11.28	9.32	0.155
Log Truck Operator <sup>1/</sup>	4.20	6.34	8.82	6.62	0.110
Powder Man	4.50	7.61	9.45	7.81	0.130
Rigging Slinger	4.77	8.06	10.02	8.28	0.138
Side Rod	6.10	10.31	12.81	10.59	0.177
Shovel Operator (Small)	4.99	8.43	10.49	8.66	0.144
Shovel Loader	5.26	8.89	11.05	9.13	0.152
Tractor Dozer Operator	5.14	8.69	10.79	8.92	0.149
Tractor Operator Large	5.05	8.53	10.61	8.75	0.146
Small	4.55	7.69	9.56	7.90	0.132
Yarding Engineer	5.12	8.65	10.75	8.88	0.148
Ave Crew Position	4.85	8.20	10.19	8.42	0.140
<sup>1/</sup> Furnishes own transportation - no call time					

<u>Summary of Adjustments</u>		<u>Straight Time</u>	<u>Overtime</u>
Workman's Benefits		19%	8%
Direct Supervision		10%	10%
Employer's Contributions		22%	22%
Transportation and Travel		13%	-
Call Time		5%	-
Total		69%	40%

<sup>2/</sup> To adjust to Schedule 19 wage rate, multiply Schedule 18 wage rate by 1.074.

9333.3 - PRODUCTION COSTS  
(Schedule 19)

## 5. Wage Rate Summary - Eastern Oregon

<u>Logging Crew</u>	<u>Basic Wage Per Hour</u>	<u>BLM Adjusted Wage Per Hour</u>		<u>Schedule 18 2/ BLM Adjusted Wage Based on 9-Hour Day</u>	
		<u>Straight Time</u>	<u>Overtime</u>	<u>Per Hour</u>	<u>Per Minute</u>
Brush Piler	3.98	6.77	8.36	6.95	.116
Choker Setter	4.00	6.80	8.40	6.98	.116
Drill Operator	4.41	7.50	9.27	7.70	.128
Dump Truck Driver	4.19	7.12	8.81	7.31	.122
Faller Bucker	7.03	11.95	7.09	12.26	.204
Fire Patrolman	3.84	6.53	8.06	6.70	.112
Grader Operator	4.39	7.46	9.23	7.66	.128
Head Choker Setter	4.02	6.83	8.44	7.01	.116
Knot Bumper	3.97	6.75	8.34	6.93	.116
Laborer	3.87	6.58	8.13	6.75	.112
Loader Operator	5.27	8.96	11.07	9.19	.153
Log Truck Operator <u>1/</u>	4.26	6.69	8.95	6.94	.116
Powder Monkey	4.32	7.34	9.07	7.53	.126
Rubber Tired					
Skidder Operator	4.49	7.63	9.44	7.83	.131
Scaler Stripper	4.45	7.57	9.35	7.77	.130
Shovel Operator	5.06	8.60	10.63	8.83	.147
Top Loader	4.55	7.74	9.56	7.94	.132
Tractor Dozer Oper.	4.61	7.84	9.69	8.05	.134
Tractor Operator	4.50	7.65	9.45	7.85	.131
Tractor Ripper Oper.	4.70	7.99	9.87	8.20	.137

1/ Furnishes own transportation - no call time

Ave	4.50	7.61	9.06	7.82	.130
-----	------	------	------	------	------

Summary of Adjustments

	<u>Straight Time</u>	<u>Overtime</u>
Workman's Benefits	19%	8%
Direct Supervision	10%	10%
Employer's Contributions	22%	22%
Transportation and Travel	14%	-
Call Time	5%	-
Total	70%	40%

2/ To adjust to Schedule 19 wage rate, multiply Schedule 18 wage rate by 1.074.





*Healy*

IN REPLY REFER TO

# United States Department of the Interior

F:Sek  
9330

BUREAU OF LAND MANAGEMENT

District Office  
P. O. Box 10226  
Eugene, Oregon 97401

March 17, 1976

Information Memo No. EG-76-8  
Expires 12/31/76

To: Area Managers, Technical Section  
From: District Appraiser  
Subject: Updated Wage and Machine Rates

Attached are current wage and machine rates for use in all future timber sale and road construction appraisals. Please insert these in your Schedule 19.

Attachment







## 9333.3 - PRODUCTION COSTS

## 4. Wage Rate Summary - Western Oregon

	Schedule 19	
	Based on	
	9 hour day	+15%
Chaser	\$ 8.24	\$ 9.48
Choker Setter	7.94	9.13
Drill Operator	8.91	10.25
Dump Truck Operator	8.29	9.53
Faller and Bucker	11.78	13.55
Grader Operator	8.86	10.19
Head Rigger	9.50	10.93
Hook Tender	10.36	11.91
Laborer	7.32	8.42
Loading Engineer		
(Grapple)	10.01	11.51
Log Truck Operator <sup>1/</sup>	7.11	8.18
Powder Man	8.39	9.65
Rigging Slinger	8.89	10.22
Side Rod	11.37	13.08
Shovel Operator		
(Small)	9.30	10.70
Shovel Loader	9.81	11.28
Tractor Dozer		
Operator	9.58	11.02
Tractor Operator		
Large	9.40	10.81
Small	8.48	9.75
Yarding Engineer	9.54	10.97
Ave. Crew Position	9.04	10.40
<sup>1/</sup> Furnishes own transportation - no call time		

Summary of Adjustments

	<u>Straight Time</u>	<u>Overtime</u>
Workman's Benefits	19%	8%
Direct Supervision	10%	10%
Employer's Contributions	22%	22%
Transportation and Travel	13%	-
Call Time	5%	-
Total	69%	40%



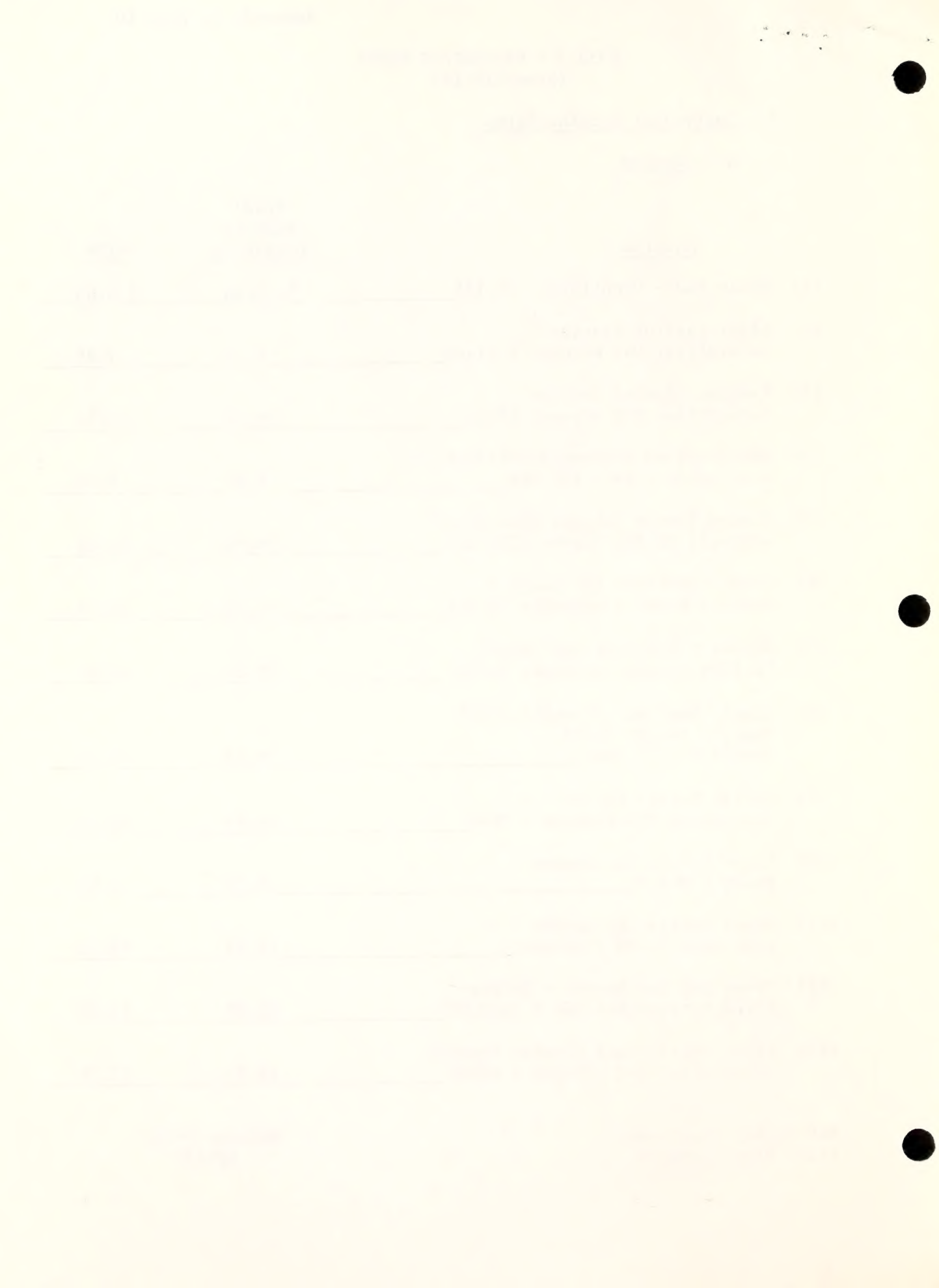


9333.3 - PRODUCTION COSTS  
(Schedule 19)

3. Individual Machine Rates

a. Summary

<u>Machine</u>	<u>Total Machine Cost/Hour</u>	<u>+15%</u>
(1) Chain Saw - McCulloch - SP-125	\$ 1.44	\$ 1.66
(2) Light Yarding Tractor Caterpillar D4D w/dozer & winch	6.34	7.29
(3) Yarding Crawler Tractor Caterpillar D7F w/power shift	16.98	19.53
(4) Rubber-tired Four-wheel Skidder John Deere - 440B (70 HP)	6.97	8.02
(5) Medium Yarder (Rigged Spar Tree) w/Skagit BU 80C Yarder (320 HP)	15.96	18.35
(6) Yarder-Portable 65' Tower - Trailer Mounted w/Berger Yarder	21.39	24.60
(7) Yarder - Portable 110' Tower Trailer Mounted w/Berger Yarder	29.51	33.94
(8) Static Skyline - Portable 110' Tower - Skagit BU-99 Yarder & 110' Tower	79.73	91.69
(9) Mobile Yarder-Loader Washington Trackloader - TL-6	18.49	21.26
(10) Light Mobile Log Loader Ramey Model M	5.70	6.56
(11) Heavy Mobile Log Loader Link-Belt TL-98 (Tracked)	14.59	16.78
(12) Front End Log Loader - Rubber- tired Caterpillar 966 C (170 HP)	12.07	13.88
(13) Light (Misc. Use) Crawler Tractor Caterpillar D6C w/blade & winch	11.53	13.26





9333.3 - PRODUCTION COSTS  
(Schedule 19)

<u>Machine</u>	<u>Total Machine Cost/Hour</u>	<u>+15%</u>
(14) Tractor Mounted Dozer Caterpillar D8H (Power Shift) w/bulldozer and ripper_____	\$ 23.27	\$ 26.76
(15) Front End (Bucket) Loader - Rubber-tired Caterpillar 950 - 2 to 2½ C.Y. _____	9.98	11.48
(16) Air Compressor & Drill - 150 CFM (Rental rate) _____	8.00	9.20
(17) Air Compressor & Track Drill - 600 CFM _____ (Rental rate) _____	38.16	43.88
(18) Motor Scraper - Two Wheel Tractor 12 to 19 C.Y. Capacity _____ (Rental rate) _____	43.50	50.03
(19) Shovel - Power ¾ C.Y. Capacity _____ (Rental rate) _____	30.30	34.85
(20) Dump Truck - Normal Duty 8 to 12 C.Y. Capacity _____ (Rental rate) _____	18.72	21.53
(21) Road Roller - Vibratory 27 to 36 HP _____ (Rental rate) _____	13.55	15.58
(22) Road Roller - Grid, 16 Ton _____ (Rental rate) _____	10.15	11.67
(23) Motor Grader - Cat No. 12F _____	7.38	8.49
(23A) Motor Grader BTWN - 2700 & 31,000 lbs. _____ (Rental rate) _____	27.97	32.17
(24) Logging Truck White - Model 4964WD with Peerless Trailer _____	12.89	14.82
(24) Crew Car (9-passenger carryall) GMC - ¾ Ton to & from job _____	1.78	2.05
Cost while in use _____	5.00	5.75





## 9333.3 - PRODUCTION COSTS

## 4. Wage Rate Summary - Western Oregon

*Based on  
9 hr. Day*

Chaser -----	\$ 8.24
Choker Setter -----	7.94
Drill Operator -----	8.91
Dump Truck Operator -----	8.29
Faller and Bucker -----	11.78
Grader Operator -----	8.86
Head Rigger -----	9.50
Hook Tender -----	10.36
Laborer -----	7.32
Loading Engineer (Grapple) -----	10.01
Log Truck Operator <u>1/</u> -----	7.11
Powder Man -----	8.39
Rigging Slinger -----	8.89
Side Rod -----	11.37
Shovel Operator (Small) -----	9.30
Shovel Loader -----	9.81
Tractor Dozer Operator -----	9.58
Tractor Operator Large -----	9.40
Small -----	8.48
Yarding Engineer -----	9.54
Ave. Crew Position -----	9.04
<u>1/</u> Furnishes own transportation - no call time	

Summary of Adjustments

	<u>Straight Time</u>	<u>Overtime</u>
Workman's Benefits	19%	8%
Direct Supervision	10%	10%
Employer's Contributions	22%	22%
Transportation and Travel	13%	-
Call Time	5%	-
TOTAL	69%	40%





Machine Notes





9333.3 - PRODUCTION COSTS  
(Schedule 19)

B. Machine Rates

The basic cost information in these rate schedules is of special interest to the field appraiser whenever he finds reason to believe the cost tables in this schedule are not representative of conditions for the individual tract being appraised. The basic cost data will provide information to make adjustments in allowances to compensate for special or unusual conditions. Care must be taken that the cost information is applied in the context and manner in which it was compiled.

1. Data Source.

a. Machine Ownership. Information on basic machine costs and operations was obtained from a statewide survey of sample forest industry companies, both large and small, as well as business firms who supply equipment and related supplies. Limited information was obtained from local governments on machine ownership and maintenance costs. Local BLM district surveys were made in an attempt to identify the type of equipment most commonly found in the woods for logging shows similar to BLM timber sales. Rates on property taxes were solicited from local county tax offices and insurance rates were obtained from local insurance firms who commonly write coverage for logging and road construction operators. There are no extensions of costs for anticipated future increases or decreases in any machine rates.

b. Machine Rental. Rental rates included in the schedule were obtained from:

U. S. Department of Transportation  
Federal Highway Administration  
Region 8

Maximum Hourly Rental Rates For Equipment  
Used On Force Account Work (without operators)  
For Oregon

Effective date      6/1/71  
(Rev.) 1/15/71

Rental rates are applied to equipment which the "average operator" does not normally own. This is not to say all ownership equipment is commonly owned by all operators. For example, an average logger may not own a variety of road building machines; however, he may commonly subcontract road building to construction companies who would own such equipment. It is assumed an integrated logging contractor or typical timber industry operator would usually only rent the types of machines for which rental rates have been used.

9333.3 - PRODUCTION COSTS  
(Schedule 19)

Rental rates for the type of equipment in this category should be obtained from local sources; when such machines are available in the area of the appraisal, and when rates appear to be substantially different than the FHA schedule. It should be noted the FHA rates are maximum rates and in many cases local rental rates may be substantially lower. Appraisers should not allow rates in excess of those included in this schedule unless it can be substantiated such equipment is not readily available at the established rate. Ownership and rental rates are included for the motor grader. Ownership rates are appropriate for initial road construction; rental rates should be considered for road maintenance, during and after logging. Rental rates for machines not listed in the schedule must be obtained from local sources.

2. Components of Machine Rates.

a. Ownership Rates. Individual machine rates, both fixed and operating costs, were developed for each piece of equipment used in the schedule. Machine rates include:

(1) Total Investment (depreciable value). This item covers the basic machine and related equipment Acquisition cost--ready "to log". It does not include equipment requiring frequent replacement such as cables, lines and chokers, tires, etc., other than items which come on the machine when purchased. The residual value was estimated at the end of the machine's useful life when full maintenance had been applied or at the end of the first depreciable period, whichever seemed appropriate for the specific machine. The total investment (depreciable value) is the difference between the acquisition cost and residual value.

(2) Average Annual Investment. This item is computed for the purpose of estimating the fixed costs of insurance and property taxes. The formula,  $AAI = \frac{A + r}{2} + \frac{d}{2}$  is used to determine this investment where:

AAI = Average Annual Investment  
 A = Original Total Acquisition Cost of New Machine  
 r = Residual Value - or value of the machine at the end of the useful life or first depreciable period when full maintenance has been applied  
 d = Straight line depreciation per year

(3) Fixed Costs. This cost category includes ownership costs whether the machine is operating or not.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

(i) Depreciation. Straight line depreciation is used in this cost schedule. The depreciable value (total investment) divided by the depreciable period (useful life or first depreciable period) equals the depreciation.

Thus: 
$$\frac{Ac - RV}{DP} = \text{Depreciation}$$

When:        Ac - is acquisition value  
              RV - is residual value  
              DP - is depreciation period (usually expressed in hours)

(ii) Insurance. Average property insurance rates for logging equipment was solicited from a major company writing such insurance in Oregon. Much of the variance related to individual operator's experience, preference rates, and the type of insurance "packages" purchased. The average for western Oregon as used in Schedule 17 is 1.0% of average annual investment.

(iii) Property Taxes. Individual county tax offices in the five western Oregon districts were solicited for tax rates applicable to logging equipment. Based on total (average) investment, average rates ranged from 1.6% to 3.0%. The average considered appropriate for Schedule 17 was 2.3% of average annual investment.

(4) Operating Costs. This cost category includes all materials incidental to operating the machine and replacement items which recur annually or more frequently, depending on actual operating time.

(i) Fuel and lubrication costs were obtained from a western Oregon survey of delivered materials made in the summer of 1969 brought up-to-date.

Fuel and lubrication rates used in Schedule 18 are:

Diesel fuel -	
without tax	\$0.215/gal
without state tax	0.255/gal
(applicable with state PUC permit)	
Gasoline -	
without tax	\$0.232/gal
with tax	0.342/gal

9333.3 - PRODUCTION COSTS  
(Schedule 19)

Lubricating oil - with tax	\$1.137/gal
Hydraulic oil - with tax	\$1.016/gal
Gear grease	\$0.254/lb.

(ii) Repairs and maintenance costs were generally determined as a percentage of depreciation as found common for the particular type of machine. This item was obtained as an estimate from equipment firms and companies owning and operating specific types and models of machines used in the schedule.

(iii) Other operating expenses such as wire rope, chokers, chains for chain saws, etc., were obtained locally from established suppliers of such material.

b. Rental Rates. Individual machine rental rates apply to actual machine operating times, i.e., clock time on the machine. When using rental rates care must be used so that they are applied in this manner, particularly if delay time is a factor in the cost estimate. These rates include fuel, oil, lubrication, repairs, maintenance, insurance and individual expenses. Additional allowance should be made for drill steel and bits, etc., i.e., expendable items and supplies. Rates are indicative of those charged for machines of modern design and in good working condition. Rates provide that the equipment is available on the job. It is necessary to allow appropriate move-in as an additional item of cost.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

c. Updating Machine Rates. The machine rates were updated to January 1974 cost by two factors - equipment related cost and petroleum related cost. The factors were developed from the "Bureau of Labor Statistics Wholesale Price Index."

(1) Equipment Related Cost Factor

(i) Machine Ownership

$$\frac{137.5}{127.3} \quad \frac{\text{Jan 1974 BLS Index 1128}}{\text{Aug 1972 (tractors other than farm)}} = 1.080$$

(ii) Machine Rental

$$\frac{137.5}{121.5} \quad \frac{\text{Jan 1974 BLS Index 1128}}{\text{Jan 1971 (tractors other than farm)}} = 1.132$$

(2) Petroleum Related Cost Factor

(i) Machine Ownership

$$\frac{271.4}{110.7} \quad \frac{\text{Jan 1974 BLS Index 057}}{\text{Aug 1972 (refined petroleum)}} = 2.452$$

(ii) Machine Rental

$$\frac{271.4}{107.9} \quad \frac{\text{Jan 1974 BLS Index 057}}{\text{Jan 1971 (refined petroleum)}} = 2.515$$





9333.3 - PRODUCTION COSTS  
(Schedule 19)

3. Individual Machine Rates

a. Summary

<u>Machine</u>	<u>Total Machine Cost/Hour</u>
(1) Chain Saw - McCulloch - SP-125 -----	\$ 1.44
(2) Light Yarding Tractor Caterpillar D4D w/dozer & winch -----	\$ 6.34
(3) Yarding Crawler Tractor Caterpillar D7F w/power shift -----	\$16.98
(4) Rubber-tired Four-wheel Skidder John Deere - 440B (70 HP) -----	\$ 6.97
(5) Medium Yarder (Rigged Spar Tree) w/Skagit BU 80C Yarder (320 HP) -----	\$ 15.96
(6) Yarder-Portable 65' Tower - Trailer Mounted w/Berger yarder -----	\$ 21.39
(7) Yarder - Portable 110' Tower Trailer Mounted w/Berger Yarder -----	\$ 29.51
(8) Static Skyline - Portable 110' Tower - Skagit BU-99 Yarder & 110' Tower -----	\$ 79.73
(9) Mobile Yarder-Loader Washington Trakloader - TL-6 -----	\$ 18.49
(10) Light Mobile Log Loader Ramey Model M -----	\$ 5.70
(11) Heavy Mobile Log Loader Link-Belt TL-98 (Tracked) -----	\$ 14.59
<del>(11A) XXXXXXXXXXXXXXXXXX(Rubber Tired)</del>	
(12) Front End Log Loader - Rubber- tired Caterpillar 966C (170 HP) -----	\$ 12.07
(13) Light (Misc. Use) Crawler Tractor Caterpillar D6C w/blade & winch -----	\$ 11.53

$$(9.127 \times 1.14) + 8.48 =$$

$$10.43$$

$$\begin{array}{r} 18.91 \\ \hline 4.30 \end{array}$$



9333.3 - PRODUCTION COSTS  
(Schedule 19)

3. Individual Machine Rates (Schedule 18)

a. Summary

	<u>Machine</u>	<u>Fixed Cost/Hour</u>	<u>Operating Cost/Hour</u>	<u>Total Machine Cost/Hour</u>
(1)	Chain Saw - McCulloch - SP-125	\$0.31	\$0.79	\$ 1.10
(2)	Light Yarding Tractor Caterpillar D4D w/dozer & winch	1.98	3.08	5.06
(3)	Yarding Crawler Tractor Caterpillar D7F w/power shift	6.24	7.32	13.56
(4)	Rubber-tired Four-wheel Skidder John Deere - 440B (70 HP)	1.92	3.81	5.73
(5)	Medium Yarder (Rigged Spar Tree) w/Skagit BU 80C Yarder (320 HP)	3.52	8.14	11.66
(6)	Yarder-Portable 65' Tower - Trailer Mounted w/Berger yarder	7.70	9.92	17.62
(7)	Yarder - Portable 110' Tower Trailer Mounted w/Berger Yarder	11.59	13.38	24.97
(8)	Static Skyline - Portable 110' Tower - Skagit BU-99 Yarder & 110' Tower	41.28	27.75	69.03
(9)	Mobile Yarder-Loader Washington Trakloader - TL-6	9.46	6.25	15.71
(10)	Light Mobile Log Loader Ramey Model M	2.35	1.82	4.17
(11)	Heavy Mobile Log Loader Link-Belt TL-98 (Tracked)	6.32	5.53	11.85
(11A)	Link-Belt HC-98 (Rubber-Tired)	8.34	7.72	16.06
(12)	Front End Log Loader - Rubber- tired Caterpillar 966C (170 HP)	3.63	5.49	9.12
(13)	Light (Misc. Use) Crawler Tractor Caterpillar D6C w/blade & winch	5.38	4.00	9.38

9333.3 - PRODUCTION COSTS  
(Schedule 19)

		(Schedule 18)	
(14) Tractor Mounted Dozer Caterpillar D8H (Power Shift) w/bulldozer and ripper	8.71	9.57	18.28
(15) Front End (Bucket) Loader - Rubber-tired Caterpillar 950 - 2 to 2-1/2 C.Y.	3.73	4.04	7.77
(16) Air Compressor & Drill - 150 CFM		(Rental rate)	6.03
(17) Air Compressor & Track Drill - 600 CFM		(Rental rate)	28.76
(18) Motor Scraper - Two Wheel Tractor 12 to 19 C.Y. Capacity		(Rental rate)	32.78
(19) Shovel - Power 3/4 C.Y. Capacity		(Rental rate)	22.83
(20) Dump Truck - Normal Duty 8 to 12 C.Y. Capacity		(Rental rate)	13.51
(21) Road Roller - Vibratory 27 to 36 HP		(Rental rate)	10.58
(22) Road Roller - Grid, 16 Ton		(Rental rate)	8.97
(23) Motor Grader - Cat No. 12F	2.65	2.78	5.43
(23A) Motor Grader BTWN - 2700 & 31,000 lbs.		(Rental rate)	19.78
(24) Logging Truck White - Model 4964WD with Peerless Trailer	4.15	5.53	9.68
(25) Crew Car (9-passenger carryall) GMC - 3/4 Ton	.42	.78	1.20



9333.3 - PRODUCTION COSTS  
(Schedule 19)

	Machine cost/hour
(14) Tractor Mounted Dozer Caterpillar D8H (Power Shift) w/bulldozer and ripper	----- \$ 23.27
(15) Front End (Bucket) Loader - Rubber-tired Caterpillar 950 - 2 to 2-1/2 C.Y.	----- \$ 9.98
(16) Air Compressor & Drill - 150 CFM (Rental rate)	----- \$8.00
(17) Air Compressor & Track Drill - 600 CFM (Rental rate)	----- \$38.16
(18) Motor Scraper - Two Wheel Tractor 12 to 19 C.Y. Capacity (Rental rate)	----- \$43.50
(19) Shovel - Power 3/4 C.Y. Capacity (Rental rate)	----- \$30.30
(20) Dump Truck - Normal Duty 8 to 12 C.Y. Capacity (Rental rate)	----- \$18.72
(21) Road Roller - Vibratory 27 to 36 HP (Rental rate)	----- \$13.55
(22) Road Roller - Grid, 16 Ton (Rental rate)	----- \$10.15
(23) Motor Grader - Cat No. 12F	----- \$ 7.38
(23A) Motor Grader BTWN - 2700 & 31,000 lbs. (Rental rate)	----- \$27.97
(24) Logging Truck White - Model 4964WD with Peerless Trailer	----- \$12.89
(25) Crew Car (9-passenger carryall) GMC - 3/4 Ton to & from job	----- \$ 1.78
Cost while in use	----- \$ 5.00





9333.3 - PRODUCTION COSTS  
(Schedule 19)

b. Operating Costs in Percent

<u>Machine</u>	<u>Petroleum Related Cost in Percent</u>	<u>Equip. Related Cost in Percent</u>	<u>Schedule 19 Updating Factor</u>
(1) Chain Saw - McCulloch - SP-125	16.4	83.6	1.305
(2) Light Yarding Tractor Caterpillar D4D w/dozer & winch	12.6	87.4	1.253
(3) Yarding Crawler Tractor Caterpillar D7F w/power shift	12.5	87.5	1.252
(4) Rubber-tired Four-wheel Skidder John Deere - 440B (70 HP)	9.9	90.1	1.216
(5) Medium Yarder (Rigged Spar Tree) w/Skagit BU 80C Yarder (320 HP)	21.1	78.9	1.369
(6) Yarder-Portable 65' Tower - Trailer Mounted w/Berger yarder	9.8	90.2	1.214
(7) Yarder - Portable 110' Tower Trailer Mounted w/Berger Yarder	7.4	92.6	1.182
(8) Static Skyline - Portable 110' Tower - Skagit BU-99 Yarder & 110' Tower	5.5	94.5	1.155
(9) Mobile Yarder-Loader Washington Trakloader - TL-6	7.1	92.9	1.177
(10) Light Mobile Log Loader Ramey Model M	20.9	79.1	1.367
(11) Heavy Mobile Log Loader Link-Belt TL-98 (Tracked)	11.0	89.0	1.231
(11A) Link-Belt HC-98 (Rubber-tired)	8.1	91.9	1.191
(12) Front End Log Loader - Rubber- tired Caterpillar 966C (170 HP)	17.7	82.3	1.323
(13) Light (misc. use) Crawler Tractor Caterpillar D6C w/blade & winch	10.8	89.2	1.228
(14) Tractor Mounted Dozer Caterpillar D8H (Power shift) w/bulldozer and ripper	14.1	85.9	1.273

9333.3 - PRODUCTION COSTS  
(Schedule 19)

<u>Machine</u>	<u>Petroleum Related Cost in Percent</u>	<u>Equip. Related Cost in Percent</u>	<u>Schedule 19 Updating Factor</u>
(15) Front End (Bucket) Loader - Rubber-tired Caterpillar 950 - 2 to 2-1/2 C.Y.	14.9	85.1	1.284
(16) Air Compressor & Drill - 150 CFM	14.1	85.9	1.327
(17) Air Compressor & Track Drill - 600 CFM	14.1	85.9	1.327
(18) Motor Scraper - Two Wheel Tractor 12 to 19 C.Y. Capacity	14.1	85.9	1.327
(19) Shovel - Power 3/4 C.Y. Capacity	14.1	85.9	1.327
(20) Dump Truck - Normal Duty 8 to 12 C.Y. Capacity	18.4	81.6	1.386
(21) Road Roller - Vibratory 27 to 36 HP	10.8	89.2	1.281
(22) Road Roller - Grid, 16 Ton	0.0	100.0	1.132
(23) Motor Grader - Cat No. 12F	20.4	79.6	1.360
(23A) Motor Grader BTWN - 2700 & 31,000 lbs.	20.4	79.6	1.414
(24) Logging Truck White = Model 4964WD with Peerless Trailer	18.4	81.6	1.332
(25) Crew Car (9-passenger carryall) GMC - 3/4 Ton	29.2	70.8	1.481



9333.3 - PRODUCTION COSTS  
(Schedule 19)

c. Rate Computations. Individual rate computations are listed in the sequence shown on the machine rate summary. Rate computation sheets summarize significant cost items. Smaller items such as towing cable sizes and lengths, rigging composition, number and sizes of tires, etc., have been summarized rather than individually listed. Wherever possible, complete machine costs - "ready to log" - were used. Distinction between ownership and rental rates are apparent.





9333.3 - PRODUCTION COSTS  
(Schedule 19)

Schedule 18 Machine Operating Rates

Item No. 1

I Description CHAINSAW  
M<sup>E</sup> CULLOCH - SP-125 - 36" Bar  
Direct Drive - Automatic Oiler - w/  
Misc Small Tools, Including FIRE EXTINGUISHER

II Rate

	<u>Ownership</u>	<u>Rental</u>
A. Fixed . . .	\$ <u>0.31</u> /hr.	\$ _____ /hr.
B. Operating .	\$ <u>0.79</u> /hr.	\$ _____ /hr.
Total . . . . .	\$ <u>1.10</u> /hr.	\$ _____ /hr.
	\$ <u>0.018</u> /min.	\$ _____ /min.

III Investment

A. Acquisition (Freight Included)

Basic Machine . . . . . \$ 462

Attachments Small Tools

\_\_\_\_\_ \$ 120

B. Residual Value (total) . . . . . \$ 105

Total based on 18 % of investment

for \_\_\_\_\_ hrs. of (useful life-first depreciable period)

\_\_\_\_\_ based on \_\_\_\_\_ % of investment.

for \_\_\_\_\_ hrs. of (useful life - first depreciable period)

C. Total Investment (depreciable value) \$ 477

D. Average Annual Investment . . . . . \$ 582 /year

9333.3 - PRODUCTION COSTS  
(Schedule 19)

IV Fixed Cost (per hour of availability) . . . . . \$ .31 /hr.  
(based on 1600 hours of annual machine availability)

- A. Depreciation . . . . . \$ .30
- B. Insurance (rate 1.0% of ave. ann. invest.) \$ —  
Annual cost of \$ 580
- C. Property Taxes (rate 2.3% of ave. ann. invest.) \$ .01  
Annual cost of \$ 13.34

V Operating Cost (per hour of operation) . . . . . \$ .79

✓ A. Fuel (diesel - gas) . . . . . \$ .07 /hr.  
2.5 gal. per hour for \$ .300 per gal.

✓ B. Oil and Grease . . . . . \$ .11 /hr.  
Lube oil - Crankcase        gph @ \$        per gal.  
Trans. & Drive        gph @ \$        per gal.  
Hyd. Oil        gph @ \$        per gal.  
Grease -        lbs per hr. @ \$        per lbs.  
Filters - \$        per hr.

C. Repairs and Maintenance . . . . . \$ .27 /hr.  
90 % of depreciation

D. Tires . . . . . \$ — /hr.  
\$        total cost @ hrs. of tire life

E. Other (specify)

*CITRUS REPLACEMENT - EACH 133 HOURS -  
12 REPLACEMENTS - @ \$45.45  
\$551.40 / 1600 = .345*

VI Remarks -

*✓ BASED ON RATES OBTAINED FROM S.W. DENEX*



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Schedule 18 Machine Operating Rates

Item No. 2

I Description LIGHT GRADING TRACTOR  
CATERPILLAR - D40 - HYDRAULIC STRAIGHT DOZER  
CANOPY - DIRECT DRIVE WINCH - DRUMLINE  
BUTT RIGGING - ETC - "READY TO LOG"

II Rate

	<u>Ownership</u>	<u>Rental</u>
A. Fixed . . .	\$ <u>1.98</u> /hr.	\$ _____ /hr.
B. Operating .	\$ <u>3.08</u> /hr.	\$ _____ /hr.
Total . . . . .	\$ <u>5.06</u> /hr.	\$ _____ /hr.
	\$ <u>0.085</u> /min.	\$ _____ /min.

III Investment

A. Acquisition (Freight Included)

Basic Machine . . . . . \$ 20038

Attachments As Listed Above

\_\_\_\_\_ \$ 8440

B. Residual Value (total) . . . . . \$ 2887

Total based on 10 % of investment

for 16000 hrs. of (useful life - first depreciable period)

\_\_\_\_\_ based on \_\_\_\_\_ % of investment.

for \_\_\_\_\_ hrs. of (useful life - first depreciable period)

C. Total Investment (depreciable value) \$ 25991

D. Average Annual Investment . . . . . \$ 17163 /year

9333.3 - PRODUCTION COSTS

(Schedule 19)

IV Fixed Cost (per hour of availability) . . . . . \$ 1.98 /hr.  
(based on 1600 hours of annual machine availability)

A. Depreciation . . . . . \$ 1.62  
B. Insurance (rate 1.0% of ave. ann. invest.) \$ 0.11  
Annual cost of \$ 172  
C. Property Taxes (rate 2.3% of ave. ann. invest.) \$ 6.25  
Annual cost of \$ 395

V Operating Cost (per hour of operation) . . . . . \$ 3.08

A. Fuel (diesel - gas) . . . . . \$ .56 /hr.  
2.6 gal. per hour for \$ .215 per gal.

B. Oil and Grease . . . . . \$ .08 /hr.  
Lube oil - Crankcase .02 gph @ \$ 11370 per gal.  
Trans. & Drive .02 gph @ \$ 11370 per gal.  
Hyd. Oil .01 gph @ \$ 1.016 per gal.  
Grease .05 lbs per hr. @ \$ .254 per lbs.  
Filters - .03 per hr.

C. Repairs and Maintenance . . . . . \$ 1.46 /hr.  
90 % of depreciation

D. Tires . . . . . \$ - /hr.  
\$ - total cost @ hrs. of tire life

E. Other (specify)

TOWING CABLE . .12 /hr.  
CHOKERS . .86 /hr.

VI Remarks -



9333.3 -- PRODUCTION COSTS  
(Schedule 19)

### Schedule 18 Machine Operating Rates

Item No. 3

Description YARDING CRAWLER TRACTOR  
CATERPILLAR D7F POWERSHIFT - HYDRO-ANGLE  
DOZER - TOWING WINCH - INTEGRAL ARCH - CHIPPY -  
EXTRA WIDE GROUNDERS - "PLOW TO LOG"

II Rate

## Ownership

## Rental

A. Fixed . . . \$ 6.25 /hr. \$ /hr.

B. Operating . \$ 7.32/hr. \$ /hr.

Total . . . . . \$ 13.56 /hr.      \$ \_\_\_\_\_ /hr.  
 . . . . . \$ .226 /min.      \$ \_\_\_\_\_ /min.

### III Investment

A. Acquisition (Freight Included)

Basic Machine . . . . . \$ 49632

Attachments AS LIST ABOVE

\$ 20 420

B. Residual Value (total) . . . . . \$ 17513

Total based on 25 % of investment

for 10000 hrs. of (useful life first depreciable period)

based on % of investment.

for hrs. of (useful life - first depreciable period)

C. Total Investment (depreciable value) \$ 52,539

D. Average Annual Investment . . . . . \$ 47985 /year

9333.3 - PRODUCTION COSTS  
(Schedule 19)

IV Fixed Cost (per hour of availability) . . . . . \$ 6.24 /hr.  
(based on 1600 hours of annual machine availability)

A. Depreciation . . . . . \$ 5.25

B. Insurance (rate 1.0% of ave. ann. invest.) \$ 0.30  
Annual cost of \$ 480

C. Property Taxes (rate 2.3% of ave. ann. invest.) \$ 0.69  
Annual cost of \$ 1104

V Operating Cost (per hour of operation) . . . . . \$ 7.32

A. Fuel (diesel - gas) . . . . . \$ 1.50 /hr.  
7.0 gal. per hour for \$ .215 per gal.

B. Oil and Grease . . . . . \$ .20 /hr.  
Lube oil - Crankcase .04 gph @ \$ 1.137 per gal.  
Trans. & Drive .05 gph @ \$ 1.137 per gal.  
Hyd. Oil .03 gph @ \$ 1.016 per gal.  
Grease .05 lbs per hr. @ \$ .254 per lbs.  
Filters -.071 per hr.

C. Repairs and Maintenance . . . . . \$ 4.46 /hr.  
90 % of depreciation

D. Tires . . . . . \$ - /hr.  
\$ - total cost @ hrs. of tire life

E. Other (specify)  
TOWING CABLE .32/hr.  
CHOKERS .84/hr.

VI Remarks -



(Schedule 19)

### Schedule 18 Machine Operating Rates

Item No. 4

'Ready To Log'

II Rate

..... \$ .092 /min.      \$        /min.

### III Investment

A. Acquisition (Freight Included)

Basic Machine . . . . . \$ 21250

B. Residual Value (total) . . . . . \$ 8500

for 8000 hrs. of (~~useful life~~-first depreciable period)

based on % of investment.

for hrs. of (useful life - first depreciable period)

C. Total Investment (depreciable value) \$ 12750

D. Average Annual Investment . . . . . \$ 16150 /year

9333.3 - PRODUCTION COSTS

(Schedule 19)

IV Fixed Cost (per hour of availability) . . . . . \$ 1.92 /hr.  
(based on 1600 hours of annual machine availability)

A. Depreciation . . . . . \$ 1.59  
B. Insurance (rate 1.0% of ave. ann. invest.) \$ 0.10  
Annual cost of \$ 161  
C. Property Taxes (rate 2.3% of ave. ann. invest.) \$ 0.23  
Annual cost of \$ 371

V Operating Cost (per hour of operation) . . . . . \$ 3.81

A. Fuel (diesel - gas) . . . . . \$ 0.43 /hr.  
2.0 gal. per hour for \$ .215 per gal.

B. Oil and Grease . . . . . \$ .14 /hr.  
Lube oil - Crankcase .05 gph @ \$ 1.1370 per gal.  
Trans. & Drive \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Hyd. Oil \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Grease .110 lbs per hr. @ \$ .254 per lbs.  
Filters -.021 per hr.

C. Repairs and Maintenance . . . . . \$ 1.43 /hr.  
90 % of depreciation

D. Tires . . . . . \$ 0.38 /hr.  
\$ 2800 total cost @ hrs. of tire life

E. Other (specify)

TOWING CABLE .33/hr.  
CHOKERS 1.10/hr.

VI Remarks -



(Schedule 19)

### Schedule 18 Machine Operating Rates

Item No. 5

I Description MEDIUM YARDOE - TIGGED SPINE TREE  
YARDOE - SKAGIT MODEL BU-80C (3RD HP)

II Rate

## Ownership

Rental

A. Fixed . . . \$ 3.52 /hr. \$ /hr.

B. Operating . \$ 8.74 /hr. \$ /hr.

Total . . . . . \$ 11.66/hr.      \$ \_\_\_\_\_/hr.  
 . . . . . \$ 0.187/min.      \$ \_\_\_\_\_/min.

### III Investment

A. Acquisition (Freight Included)

Basic Machine . . . . . \$ 55300

Attachments ASSOCIATED RIGGING \$ 6300

B. Residual Value (total) . . . . . \$ 6160

Ypander based on 10 % of investment  
for 20000 hrs. of (useful life-first depreciable period)

As per Return based on 0 % of investment.

for 2000 hrs. of (useful life - first depreciable period)

C. Total Investment (depreciable value) \$ 55440

D. Average Annual Investment . . . . . \$ 36098 /year

9333.3 - PRODUCTION COSTS

(Schedule 19)

- IV Fixed Cost (per hour of availability) . . . . . \$ 3.52 /hr.  
(based on 1600 hours of annual machine availability)
- A. Depreciation . . . . . \$ 2.77
- B. Insurance (rate 1.0% of ave. ann. invest.) \$ 0.23  
Annual cost of \$ 361
- C. Property Taxes (rate 2.3% of ave. ann. invest.) \$ 0.52  
Annual cost of \$ 830
- V Operating Cost (per hour of operation) . . . . . \$ 8.14
- A. Fuel (diesel - gas) . . . . . \$ 2.15 /hr.  
10.0 gal. per hour for \$ .215 per gal.
- 2/ B. Oil and Grease . . . . . \$ .31 /hr.  
Lube oil - Crankcase \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Trans. & Drive \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Hyd. Oil \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Grease - \_\_\_\_\_ lbs per hr. @ \$ \_\_\_\_\_ per lbs.  
Filters - \$ \_\_\_\_\_ per hr.
- C. Repairs and Maintenance . . . . . \$ 1.75 /hr.  
63 % of depreciation
- D. Tires . . . . . \$ \_\_\_\_\_ /hr.  
\$ \_\_\_\_\_ total cost @ hrs. of tire life
- E. Other (specify)  
WIRE ROPE 3.12 /hr.  
CHOKERS - .81 /hr.

VI Remarks -

- 1/ INCLUDES COST OF SLED.  
2/ OIL & GREASE EST. AT 15% OF FUEL COST.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

### Schedule 18 Machine Operating Rates

Item No. 6

I Description YARDER - PORTABLE GS TOWER  
BERGER STANDARD YARDER - PORTABLE TOWER.  
TRAILER MOUNTED  
ASSOCIATED HEAVY EXTERIOR RIGGING

II Rate

## Ownership

Rental

A. Fixed . . . \$ 7.70 /hr.                      \$        /hr.

B. Operating . \$ 9.92 /hr. \$ /hr.

Total . . . . . \$ 17.62/hr.      \$ \_\_\_\_\_/hr.  
 . . . . . \$ 0.294 /min.      \$ \_\_\_\_\_/min.

### III Investment

A. Acquisition (Freight Included)

Basic Machine *LYNEDER* . . . . . \$ 52200

Attachments *Tower / Trailer* *11/2/2008* *55680*

Assoc LIGGING \$ 8120

B. Residual Value (total) . . . . . \$ 16182

4 mcden/Tower based on 15 % of investment

for 16000 hrs. of (useful life-first depreciable period)

Assoc. Picking based on 0 % of investment.

for 16000 hrs. of (useful life - first depreciable period)

C. Total Investment (depreciable value) \$ 99,818

D. Average Annual Investment . . . . . \$ 71082 /year

9333.3 - PRODUCTION COSTS  
(Schedule 19)

IV Fixed Cost (per hour of availability) . . . . . \$ 7.70 /hr.  
(based on 1600 hours of annual machine availability)

A. Depreciation . . . . . \$ 6.24  
B. Insurance (rate 1.0% of ave. ann. invest.) \$ 0.44  
Annual cost of \$ 711.  
C. Property Taxes (rate 2.3% of ave. ann. invest.) \$ 1.02  
Annual cost of \$ 1634

V Operating Cost (per hour of operation) . . . . . \$ 9.92

A. Fuel (diesel - gas) . . . . . \$ 1.51 /hr.  
7.0 gal. per hour for \$ .215 per gal.

1/ B. Oil and Grease . . . . . \$ .22 /hr.  
Lube oil - Crankcase \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Trans. & Drive \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Hyd. Oil \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Grease - \_\_\_\_\_ lbs per hr. @ \$ \_\_\_\_\_ per lbs.  
Filters - \$ \_\_\_\_\_ per hr.

C. Repairs and Maintenance . . . . . \$ 3.93 /hr.  
63 % of depreciation

D. Tires . . . . . \$ - /hr.  
\$ - total cost @ hrs. of tire life

E. Other (specify)

WIRE ROPE 3.25 /hr.  
CHOKERS 1.00 /hr.

VI Remarks -

1/ OIL & GREASE COST BASED ON 15% OF FUEL COST.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Schedule 18 Machine Operating Rates

Item No. 7

I Description YARDER - PORTABLE 110' TOWER  
BERGIER ME STANDARD YARDER - PORTABLE TOWER  
TRAILER MOUNTED  
ASSOCIATED HEAVY EXTERIOR RIGGING

II Rate

Ownership

Rental

A. Fixed . . . \$ 11.59 /hr. \$ \_\_\_\_ /hr.

B. Operating . \$ 13.38 /hr. \$ \_\_\_\_ /hr.

Total . . . . . \$ 24.97 /hr. \$ \_\_\_\_ /hr.  
. . . . . \$ 0.416 /min. \$ \_\_\_\_ /min.

III Investment

A. Acquisition (Freight Included)

Basic Machine YARDER . . . . . \$ 92750  
Attachments TRAILER MOUNT TOWER - 73500  
ASSOC. RIGGING \$ 8750

B. Residual Value (total) . . . . . \$ 24937

YARDER  
TRAILER based on \_\_\_\_ % of investment  
for 16000 hrs. of (useful life-first depreciable period)  
RIGGING based on 0 % of investment.  
for 16000 hrs. of (useful life - first depreciable period)

C. Total Investment (depreciable value) \$ 150063

D. Average Annual Investment . . . . . \$ 107471 /year

9333.3 - PRODUCTION COSTS  
(Schedule 19)

IV Fixed Cost (per hour of availability) . . . . . \$ 11.59 /hr.  
(based on 1600 hours of annual machine availability)

A. Depreciation . . . . . \$ 9.38  
B. Insurance (rate 1.0% of ave. ann. invest.) \$ 0.67  
Annual cost of \$ 1075  
C. Property Taxes (rate 2.3% of ave. ann. invest.) \$ 1.54  
Annual cost of \$ 2472

V Operating Cost (per hour of operation) . . . . . \$ 13.38

A. Fuel (diesel - gas) . . . . . \$ 1.61 /hr.  
7.5 gal. per hour for \$ .215 per gal.

1 B. Oil and Grease . . . . . \$ .23 /hr.  
Lube oil - Crankcase \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Trans. & Drive \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Hyd. Oil \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Grease - \_\_\_\_\_ lbs per hr. @ \$ \_\_\_\_\_ per lbs.  
Filters - \$ \_\_\_\_\_ per hr.

C. Repairs and Maintenance . . . . . \$ 5.91 /hr.  
63 % of depreciation

D. Tires . . . . . \$ \_\_\_\_\_ /hr.  
\$ \_\_\_\_\_ total cost @ hrs. of tire life

E. Other (specify)

WIRE ROPE 4.41/hr  
CHOKERS 1.21/hr

VI Remarks -

1 OIL & GREASE COST BASED ON 15% OF FUEL COST.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

### Schedule 18 Machine Operating Rates

Item No. 8

I	Description	STATIC SKYLINE - PORTABLE 120' TOWER SKAGIT BU 99 YACOB - T120 TOWER & REC-15 SKYLINE (Radio Controlled) - SKYLINE SINGLE DECK ASSOCIATED Heavy RIGGING -
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II Rate

	<u>Ownership</u>	<u>Rental</u>
A. Fixed . . .	\$ <u>41.28</u> /hr.	\$ _____/hr.
B. Operating .	\$ <u>27.75</u> /hr.	\$ _____/hr.
Total . . . . .	\$ <u>69.03</u> /hr.	\$ _____/hr.
	\$ <u>1.151</u> /min.	\$ _____/min.

### III Investment

A. Acquisition (Freight Included)

Basic Machine . . . . . \$ 361 745

Attachments \_\_\_\_\_

\_\_\_\_\_ \$ \_\_\_\_\_

B. Residual Value (total) . . . . . \$ 44300

\_\_\_\_\_ based on \_\_\_\_\_ % of investment

for \_\_\_\_\_ hrs. of (useful life-first depreciable period)

\_\_\_\_\_ based on \_\_\_\_\_ % of investment.

for \_\_\_\_\_ hrs. of (useful life - first depreciable period)

C. Total Investment (depreciable value) \$ 317445

D. Average Annual Investment . . . . . \$ 231080 /year

9333.3 - PRODUCTION COSTS

(Schedule 19)

IV Fixed Cost (per hour of availability) . . . . . \$ 41.28 /hr.  
(based on 1600 hours of annual machine availability)

A. Depreciation . . . . . \$ 35.07  
B. Insurance (rate 2.0% of ave. ann. invest.) \$ 2.89  
Annual cost of \$ 4621  
C. Property Taxes (rate 2.3 of ave. ann. invest.) \$ 3.32  
Annual cost of \$ 5315

V Operating Cost (per hour of operation) . . . . . \$ 27.75

1) A. Fuel (diesel - gas) . . . . . \$ 3.28 /hr.  
15.25 gal. per hour for \$ .215 per gal.

1) B. Oil and Grease . . . . . \$ .49 /hr.  
Lube oil - Crankcase        gph @ \$        per gal.  
Trans. & Drive        gph @ \$        per gal.  
Hyd. Oil        gph @ \$        per gal.  
Grease -        lbs per hr. @ \$        per lbs.  
Filters - \$        per hr.

C. Repairs and Maintenance . . . . . \$ 15.64 /hr.  
50 % of depreciation - YARDER, SKY CR, LIMO EQUIPMENT - 15.21  
20 % of DEPRECIATION - SINGLE DRUM - 0.43

D. Tires . . . . . \$        /hr.  
\$        total cost @ hrs. of tire life

E. Other (specify)  
WIRE POPE  
YARDER TOWER & SKY CR - 4.97 /hr.  
SINGLE DRUM - 2.12 /hr.  
CHOKERS - 1.25 /hr.

INVESTMENT:		ACQUISITION	LIFE (HOURS)	REMOVAL (%)	TOTAL INVEST.
YARDER -	}	272000	16000	15	231200
TOWER -			16000	15	
SKY CR -		43000	3200	0	43000
DRUM -		35000	16000	10	31500
RIGGING -		11745	4800	0	11745
TOTAL		361745			317445

VII REMARKS -

FUEL RATE - YARDER - 11.5 gal/hr.  
SKY CR - 3.5 gal/hr.  
DRUM - .25 gal/hr.  
OIL & GREASE COST - 15% OF FUEL COST.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Schedule 18 Machine Operating Rates

Item No. 9

1	Description
	MOBILE YARDER - LOADER
	Washington TRAKLOADER TL-6
	RUBBER Tired CARRIER - w/guy Drum - STANDARD
	OUT RIGGING - LOADING GRAPPLES - "Pony to Log"

II Rate

## Ownership

## Rental

A. Fixed . . . \$ 9.46 /hr. \$ \_\_\_\_\_ /hr.

B. Operating . \$ 6.25 /hr. \$ /hr.

Total . . . . . \$ 15.71 /hr.      \$ \_\_\_\_\_ /hr.  
 . . . . . \$ .262 /min.      \$ \_\_\_\_\_ /min.

### III Investment

A. Acquisition (Freight Included)

Basic Machine . . . . . \$ 167375

Attachments ASSOCIATED KIGGINA \$ 2500

B. Residual Value (total) . . . . . \$ 50200

Brill machine based on 30 % of investment

for 16000 hrs. of (useful life-first depreciable period)

Figuring based on 0 % of investment.

for 16000 hrs. of (useful life - first depreciable period)

C. Total Investment (depreciable value) \$ 119,675

D. Average Annual Investment . . . . . \$ 116020 /year

9333.3 - PRODUCTION COSTS  
(Schedule 19)

IV Fixed Cost (per hour of availability) . . . . . \$ 9.46 /hr.  
(based on 1600 hours of annual machine availability)

A. Depreciation . . . . . \$ 7.32  
B. Insurance (rate 1.0% of ave. ann. invest.) \$ 0.72  
Annual cost of \$ 1160  
C. Property Taxes (rate 2.3% of ave. ann. invest.) \$ 1.42  
Annual cost of \$ 2268

V Operating Cost (per hour of operation) . . . . . \$ 6.25

A. Fuel (diesel - gas) . . . . . \$ \_\_\_\_\_ /hr.  
4.5 gal. per hour for \$ \_\_\_\_\_ per gal.

B. Oil and Grease . . . . . \$ .15 /hr.  
Lube oil - Crankcase \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Trans. & Drive \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Hyd. Oil \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Grease - \_\_\_\_\_ lbs per hr. @ \$ \_\_\_\_\_ per lbs.  
Filters - \$ \_\_\_\_\_ per hr.

C. Repairs and Maintenance . . . . . \$ 2.20 /hr.  
30 % of depreciation

D. Tires . . . . . \$ .18 /hr.  
2892 / 16000 total cost @ hrs. of tire life

E. Other (specify)

WIRE ROPE -  
RUNNING LINES @ <sup>#</sup>2500 - REPLACE EACH 1000 HOURS -  
RATE - 2.50/hr.  
CHOKERS - - - .25/hr.

VI Remarks -

1) OIL & GREASE COST BASED ON 15% OF FUEL COST.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Schedule 18 Machine Operating Rates

Item No. 10

I Description LIGHT MOBILE LOG LOADER  
RAMEY MODEL M - MAINTAINED USED  
LOGGING TRUCK  
CAB - GRAPPLE - EXTREME WIDE STABILIZERS -

II Rate

	<u>Ownership</u>	<u>Rental</u>
A. Fixed . . .	\$ <u>2.35</u> /hr.	\$ _____ /hr.
B. Operating .	\$ <u>1.82</u> /hr.	\$ _____ /hr.
Total . . . . .	\$ <u>4.17</u> /hr.	\$ _____ /hr.
	\$ <u>0.070</u> /min.	\$ _____ /min.

III Investment

A. Acquisition (Freight Included)  
Basic Machine . . . . . \$ 17500  
1) Attachments USED TRUCK & INSTALLATION  
\$ 6500  
B. Residual Value (total) . . . . . \$ 3500  
LOADER based on 20 % of investment  
for 10000 hrs. of (useful life - first depreciable period)  
\_\_\_\_\_ based on \_\_\_\_\_ % of investment.  
for \_\_\_\_\_ hrs. of (useful life - first depreciable period)  
C. Total Investment (depreciable value) \$ 20500  
D. Average Annual Investment . . . . . \$ 14870 /year

9333.3 - PRODUCTION COSTS

(Schedule 19)

- IV Fixed Cost (per hour of availability) . . . . . \$ 2.35 /hr.  
(based on 1600 hours of annual machine availability)
- A. Depreciation . . . . . \$ 2.05
- B. Insurance (rate 1.0% of ave. ann. invest.) \$ 0.09  
Annual cost of \$ 150
- C. Property Taxes (rate 2.3% of ave. ann. invest.) \$ 0.21  
Annual cost of \$ 342
- V Operating Cost (per hour of operation) . . . . . \$ 1.82
- A. Fuel (diesel - gas) . . . . . \$ .65 /hr.  
3.0 gal. per hour for \$ .215 per gal.
- B. Oil and Grease . . . . . \$ .22 /hr.  
Lube oil - Crankcase .05 gph @ \$ 1.1370 per gal.  
Trans. & Drive .03 gph @ \$ 1.1370 per gal.  
Hyd. Oil .03 gph @ \$ 1.016 per gal.  
Grease .05 lbs per hr. @ \$ .254 per lbs.  
Filters -.07 per hr.
- C. Repairs and Maintenance . . . . . \$ .041 /hr.  
20 % of depreciation
- D. Tires . . . . . \$ 0.04 /hr.  
\$ 375 total cost @ hrs. of tire life
- E. Other (specify)  
CABLE COSTS - - - .50/hr.

VI Remarks -

1) LOGGING TRUCK - 5+ YEARS OLD  
W/OUT TRAILER OR BUNKS.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Schedule 18. Machine Operating Rates

Item No. 11

I Description Heavy Mobile Log Loader  
LINK - BELT - TL-98 Track Loader  
w/Young Boom & 60" Grapple  
N. 495 Cummins Diesel

II Rate

Ownership

Rental

A. Fixed . . . \$ 6.32 /hr. \$ \_\_\_\_\_/hr.

B. Operating . \$ 5.53 /hr. \$ \_\_\_\_\_/hr.

Total . . . . . \$ 11.85 /hr. \$ \_\_\_\_\_/hr.  
. . . . . \$ 0.198 /min. \$ \_\_\_\_\_/min.

III Investment

A. Acquisition (Freight Included)

Basic Machine . . . . . \$ 100,000

Attachments \_\_\_\_\_  
\$ \_\_\_\_\_

B. Residual Value (total) . . . . . \$ 20,000

Total based on 20 % of investment

for 16,000 hrs. of (useful life-first depreciable period)

\_\_\_\_\_ based on \_\_\_\_\_ % of investment.

for \_\_\_\_\_ hrs. of (useful life - first depreciable period)

C. Total Investment (depreciable value) \$ 80,000

D. Average Annual Investment . . . . . \$ 64,000 /year

9333.3 - PRODUCTION COSTS  
(Schedule 19)

IV Fixed Cost (per hour of availability) . . . . . \$ 6.32/hr.  
(based on 600 hours of annual machine availability)

- A. Depreciation . . . . . \$ 5.00
- B. Insurance (rate 1.0 % of ave. ann. invest.) \$ 0.40  
Annual cost of \$ 640
- C. Property Taxes (rate 2.3 of ave. ann. invest.) \$ 0.92  
Annual cost of \$ 1472

V Operating Cost (per hour of operation) . . . . . \$ 5.53

- A. Fuel (diesel - gas) . . . . . \$ 1.08 /hr.  
5.0 gal. per hour for \$ .215 per gal.
- B. Oil and Grease . . . . . \$ .22 /hr.  
Lube oil - Crankcase, 05 gph @ \$ 1.1370 per gal.  
Trans. & Drive, 03 gph @ \$ 1.1370 per gal.  
Hyd. Oil, 03 gph @ \$ 1.016 per gal.  
Grease, 05 lbs per hr. @ \$ .254 per lbs.  
Filters - 07 per hr.
- C. Repairs and Maintenance . . . . . \$ 3.00 /hr.  
60 % of depreciation
- D. Tires . . . . . \$ - /hr.  
\$ - total cost @ hrs. of tire life
- E. Other (specify)

CABLE COSTS - - - 1.23/hr.

VI Remarks -



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Schedule 18 Machine Operating Rates

Item No. 11A

I Description 1-HEAVY MOBILE LOG LOADER -  
LINK - BELT - HC-98 - RUBBER TIRED.  
W/YOUNG BOOM + 60" GRAPPLE.  
N-495 CUMMINS DIESEL.

II	<u>Rate</u>	<u>Ownership</u>	<u>Rental</u> <sup>1/</sup>
A.	Fixed ...	\$ <u>8.34</u> /hr.	\$ _____ /hr.
B.	Operating	\$ <u>7.72</u> _____	\$ _____ /hr.
	Total . . . . .	\$ <u>16.06</u> /hr.	\$ _____ /hr.
		\$ <u>0.268</u> /min	\$ _____ /min.

1/ Based on schedule \_\_\_\_\_

III Investment

A. Acquisition (freight included)

Basic Machine . . . . . \$ 132000

Attachments \_\_\_\_\_

\_\_\_\_\_ \$ \_\_\_\_\_

B. Residual Value (total) . . . . . \$ 26400

TOTAL MACHINE based on 20 % of investment

for 16000 hrs. of (useful life-first depreciable period)

\_\_\_\_\_ based on \_\_\_\_\_ % of investment.

for \_\_\_\_\_ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) \$ 105600

D. Average Annual Investment . . . . . \$ 84480 /yr.

9333.3 - PRODUCTION COSTS  
(Schedule 19)

IV Fixed Cost (per hour of availability . . . . . \$ 8.34 /hr.  
(based on 1600 hours of annual machine availability)

A. Depreciation . . . . . \$ 6.60

B. Insurance (rate 1.0 % of ave. ann. invest.) \$ 0.53  
Annual cost of \$ 845.

C. Property Taxes (rate 2.3 % of ave.ann.invest) \$ 1.21  
Annual cost of \$ 1943.

V Operating Cost(per hour of operation) . . . . . \$ 7.72  
~~6.68~~

A. Fuel (diesel - gas) . . . \$ 1.08 /hr.  
5.0 gal. per hour for \$ .215 per gal.

B. Oil and Grease . . . . . \$ .22 /hr.  
Lube oil - Crankcase .05 gph @ \$ 1.137 per gal.  
Trans. & Drive .03 gph @ \$ 1.137 per gal.  
Hyd. Oil .03 gph @ \$ 1.016 per gal.  
Grease .05 lbs. per hr. @ \$ .254 per lbs.  
Filters-\$ .07 per hr.

C. Repairs and Maintenance . . . . . \$ 3.96 /hr.  
60 % of depreciation

D. Tires . . . . . \$ 1.23 /hr.  
\$ 2664 / 16000 total cost @ "16000" hrs. of tire life.

E. Other (specify)  
CABLE COSTS - - - 1.23/hr.

VI Remarks - 1/ (Note: All costs are included in rental rates.)



9333.3 - PRODUCTION COSTS  
(Schedule 19)Schedule 18 Machine Operating RatesItem No. 12

I Description FRONT END LOG LOADER - RUBBER-TIRED  
CATERPILLAR 966C - 170 FLYWHEEL HP - FOWNSHIFT  
EQUIPPED FOR LOGGING - W/ HYDRO LOG FORK LIFT  
ALL WEATHER CAB -

II Rate

	<u>Ownership</u>	<u>Rental</u> <sup>1/</sup>
A. Fixed ...	\$ <u>3.63</u> /hr.	\$ _____ /hr.
B. Operating	\$ <u>5.49</u> /hr.	\$ _____ /hr.
Total . . . . .	\$ <u>9.12</u> /hr.	\$ _____ /hr.
	\$ <u>.152</u> /min.	\$ _____ /min.

1/ Based on schedule \_\_\_\_\_

III Investment

## A. Acquisition (freight included)

Basic Machine . . . . . \$ 57409Attachments TOTAL - "Ready to Log."

\_\_\_\_\_ \$ \_\_\_\_\_

B. Residual Value (total) . . . . . \$ 11482FORM MACHINE based on 20 % of investmentfor 16000 hrs. of (useful life-first depreciable  
period)

\_\_\_\_\_ based on \_\_\_\_\_ % of investment.

for \_\_\_\_\_ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) \$ 45927D. Average Annual Investment . . . . . \$ 36750 /yr.

9333.3 - PRODUCTION COSTS  
(Schedule 19)

IV Fixed Cost (per hour of availability . . . . . \$ 3.63 /hr.  
(based on 1600 hours of annual machine availability)

A. Depreciation . . . . . \$ 2.87

B. Insurance (rate 1.0 % of ave. ann. invest.) \$ 0.23  
Annual cost of \$ 367.

C. Property Taxes (rate 2.3 % of ave.ann.invest) \$ 0.53  
Annual cost of \$ 844.

V Operating Cost(per hour of operation) . . . . . \$ 5.49

A. Fuel (diesel - gas) . . . \$ 1.29 /hr.  
6.0 gal. per hour for \$ .215 per gal.

4 B. Oil and Grease . . . . . \$ .32 /hr.  
Lube oil - Crankcase \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Trans. & Drive \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Hyd. Oil \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Grease- \_\_\_\_\_ lbs. per hr. @ \$ \_\_\_\_\_ per lbs.  
Filters-\$ \_\_\_\_\_ per hr.

C. Repairs and Maintenance . . . . . \$ 2.58 /hr.  
90 % of depreciation

D. Tires . . . . . \$ 1.30 /hr.  
\$ 20850 total cost @ "16000" hrs. of tire life.

E. Other (specify)

VI Remarks - <sup>1/</sup> (Note: All costs are included in rental rates.)

\* OIL & GREASE COST BASED ON 25% OF FUEL COST +



9333.3 - PRODUCTION COSTS  
(Schedule 19)Schedule 18 Machine Operating RatesItem No. 13I Description LIGHT (MISC-USE) CRAWLER TRACTOR  
CATERPILLAR D6C  
W/ DOZER BLADE & WINDMILL.

II	<u>Rate</u>	<u>Ownership</u>	<u>Rental</u> <sup>1/</sup>
A.	Fixed ...	\$ <u>5.38</u> /hr.	\$ _____ /hr.
B.	Operating	\$ <u>4.00</u> /hr.	\$ _____ /hr.
	Total . . . . .	\$ <u>9.38</u> /hr.	\$ _____ /hr.
		\$ <u>0.156</u> /min.	\$ _____ /min.

<sup>1/</sup> Based on schedule \_\_\_\_\_III Investment

A. Acquisition (freight included)

Basic Machine . . . . . \$ 57400Attachments TOTAL

\_\_\_\_\_ \$ \_\_\_\_\_

B. Residual Value (total) . . . . . \$ 11480TOTAL MACHINE based on 20 % of investmentfor 10000 hrs. of (useful life-first depreciable  
period)

\_\_\_\_\_ based on \_\_\_\_\_ % of investment.

for \_\_\_\_\_ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) \$ 45920D. Average Annual Investment . . . . . \$ 38114 /yr.

9333.3 - PRODUCTION COSTS  
(Schedule 19)

IV Fixed Cost (per hour of availability . . . . . \$ 5.38 /hr.  
(based on 1600 hours of annual machine availability)

A. Depreciation . . . . . \$ 4.59

B. Insurance (rate 1.0 % of ave. ann. invest.) \$ 0.24  
Annual cost of \$ 381.

C. Property Taxes (rate 2.3 % of ave.ann.invest) \$ 0.55  
Annual cost of \$ 877.

V Operating Cost(per hour of operation) . . . . . \$ 4.00

A. Fuel (diesel - gas) . . . \$ .75 /hr.  
3.5 gal. per hour for \$ 2.15 per gal.

B. Oil and Grease . . . . . \$ .26 /hr.  
Lube oil - Crankcase .05 gph @ \$ 1.137 per gal.  
Trans. & Drive .04 gph @ \$ 1.137 per gal.  
Hyd. Oil .03 gph @ \$ 1.102 per gal.  
Grease .06 lbs. per hr. @ \$ .254 per lbs.  
Filters-\$ .09 per hr.

\*C. Repairs and Maintenance . . . . . \$ 289 /hr.  
63 % of depreciation

D. Tires . . . . . \$ \_\_\_\_\_ /hr.  
\$ \_\_\_\_\_ total cost @ " \_\_\_\_\_ " hrs. of tire life.

E. Other (specify)

TOWING CABLES - .10/hr

VI Remarks - 1/ (Note: All costs are included in rental rates.)

\*EQUIPMENT SUPPLIERS ESTIMATE



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Schedule 18 Machine Operating Rates

Item No. 14

I Description TRACTOR MOUNTED DOZER  
CATERPILLER D8H - POWER SHIFT  
8U DOZER WITH TILT CYLINDER, 8D REAR W/  
2 SHANKS - "READY FOR FORM BUILDING"

II Rate

	<u>Ownership</u>	<u>Rental</u> <sup>1/</sup>
A. Fixed ...	\$ <u>8.71</u> /hr.	\$ _____ /hr.
B. Operating	\$ <u>9.57</u> /hr.	\$ _____ /hr.
Total . . . . .	\$ <u>18.28</u> /hr.	\$ _____ /hr.
. . . . .	\$ <u>0.305</u> /min.	\$ _____ /min.

1/ Based on schedule \_\_\_\_\_

III Investment

A. Acquisition (freight included)

Basic Machine . . . . . \$ 97694

Attachments Complete

\_\_\_\_\_ \$ \_\_\_\_\_

B. Residual Value (total) . . . . . \$ 24424

TOTAL MACHINE based on 25 % of investment

for 10 000 hrs. of (useful life-first depreciable period)

\_\_\_\_\_ based on \_\_\_\_\_ % of investment.

for \_\_\_\_\_ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) \$ 73270

D. Average Annual Investment . . . . . \$ 66920 /yr.

9333.3 - PRODUCTION COSTS  
(Schedule 19)

IV Fixed Cost (per hour of availability . . . . . \$ 8.71 /hr.  
(based on 1600 hours of annual machine availability)

A. Depreciation . . . . . \$ 7.33

B. Insurance (rate 10 % of ave. ann. invest.) \$ 0.42  
Annual cost of \$ 669 .

C. Property Taxes (rate 2.3 % of ave.ann.invest) \$ 0.96  
Annual cost of \$ 1539 .

V Operating Cost(per hour of operation) . . . . . \$ 9.57

A. Fuel (diesel - gas) . . . \$ 2.25 /hr.  
10.6 gal. per hour for \$ .215 per gal.

B. Oil and Grease . . . . . \$ .33 /hr.  
Lube oil - Crankcase .07 gph @ \$ 1.137 per gal.  
Trans. & Drive .05 gph @ \$ 1.137 per gal.  
Hyd. Oil .03 gph @ \$ 1.016 per gal.  
Grease .05 lbs. per hr. @ \$ 0.254 per lbs.  
Filters-\$ .154 per hr.

C. Repairs and Maintenance . . . . . \$ 6.60 /hr.  
90 % of depreciation

D. Tires . . . . . \$ \_\_\_\_\_ /hr.  
\$ \_\_\_\_\_ total cost @ " \_\_\_\_\_ " hrs. of tire life.

E. Other (specify)

VI 1/  
Remarks - (Note: All costs are included in rental rates.)

Cutting Edges - - - - .21 /hr.  
END BITS - - - - .15 /hr.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Schedule 18 Machine Operating Rates

Item No. 15

I Description FRONT END (BUCKET) LOADER - RUBBER-TIRED  
CATERPILLAR - 950 - 130 FLYWHEEL HP -  
2- to 2 1/2 CU. YARD BUCKET - W/ TOOTH GROUP &  
EXTENSIONS - ALL WEATHER CAB & COUNTERWEIGHTS.

II Rate

	<u>Ownership</u>	<u>Rental</u> <sup>1/</sup>
A. Fixed ...	\$ <u>3.73</u> /hr.	\$ _____ /hr.
B. Operating	\$ <u>4.04</u> /hr.	\$ _____ /hr.
Total . . . . .	\$ <u>7.77</u> /hr.	\$ _____ /hr.
	\$ <u>0.130</u> /min.	\$ _____ /min.

<sup>1/</sup> Based on schedule \_\_\_\_\_

III Investment

A. Acquisition (freight included)

Basic Machine . . . . . \$ 41885

Attachments Complete  
\_\_\_\_\_ \$ \_\_\_\_\_

B. Residual Value (total) . . . . . \$ 10471

\_\_\_\_\_ based on \_\_\_\_\_ % of investment

for \_\_\_\_\_ hrs. of (useful life-first depreciable period)

\_\_\_\_\_ based on \_\_\_\_\_ % of investment.

for \_\_\_\_\_ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) \$ 31414

D. Average Annual Investment . . . . . \$ 28691 /yr.

9333.3 - PRODUCTION COSTS  
(Schedule 18)

IV Fixed Cost (per hour of availability . . . . . \$ 3.73 /hr.  
(based on 1600 hours of annual machine availability)

A. Depreciation . . . . . \$ 3.14

B. Insurance (rate 1.0 % of ave. ann. invest.) \$ 0.18  
Annual cost of \$ 287 .

C. Property Taxes (rate 2.3 % of ave.ann.invest) \$ 0.41  
Annual cost of \$ 660 .

V Operating Cost(per hour of operation) . . . . . \$ 4.04

A. Fuel (diesel - gas) . . . \$ .99 /hr.  
4.6 gal. per hour for \$ .215 per gal.

B. Oil and Grease . . . . . \$ 17 /hr.  
Lube oil - Crankcase .03 gph @ \$ 1.137 per gal.  
Trans. & Drive .03 gph @ \$ 1.137 per gal.  
Hyd. Oil .04 gph @ \$ 1.016 per gal.  
Grease .03 lbs. per hr. @ \$ 1.254 per lbs.  
Filters-\$ .058 per hr.

C. Repairs and Maintenance . . . . . \$ 2.36 /hr.  
75 % of depreciation

D. Tires . . . . . \$ .52 /hr.  
\$ 5248 total cost @ 10000 hrs. of tire life.

E. Other (specify)

VI Remarks - <sup>1/</sup> (Note: All costs are included in rental rates.)



(Schedule 19)

### Schedule 18 Machine Operating Rates

Item No. 16

DRILL STEEL & BITS NOT FURNISHED W/ RENTAL RATE

II Rate

## Ownership

## Rental

A. Fixed . . . \$ /hr. \$ /hr.

STEEL & BITS. 45/hr

. . . . . \$            /min.                      \$ 101 /min.

III

Investment

A. Acquisition (Freight Included)

Basic Machine . . . . . \$

Attachments

B. Residual Value (total) . . . . . \$

based on % of investment

for hrs. of (useful life-first depreciable period)

based on % of investment.

for hrs. of (useful life - first depreciable period)

C. Total Investment (depreciable value) \$

D. Average Annual Investment . . . . . \$ /year

9333.3 - PRODUCTION COSTS  
(Schedule 18)

- IV Fixed Cost (per hour of availability) . . . . . \$ \_\_\_\_\_/hr.  
(based on \_\_\_\_\_ hours of annual machine availability)
- A. Depreciation . . . . . \$ \_\_\_\_\_
- B. Insurance (rate 1.2% of ave. ann. invest.) \$ \_\_\_\_\_  
Annual cost of \$ \_\_\_\_\_
- C. Property Taxes (rate 2.4% of ave. ann. invest.) \$ \_\_\_\_\_  
Annual cost of \$ \_\_\_\_\_
- V Operating Cost (per hour of operation) . . . . . \$ \_\_\_\_\_
- A. Fuel (diesel - gas) . . . . . \$ \_\_\_\_\_/hr.  
\_\_\_\_\_ gal. per hour for \$ \_\_\_\_\_ per gal.
- B. Oil and Grease . . . . . \$ \_\_\_\_\_/hr.  
Lube oil - Crankcase \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Trans. & Drive \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Hyd. Oil \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Grease - \_\_\_\_\_ lbs per hr. @ \$ \_\_\_\_\_ per lbs.  
Filters - \$ \_\_\_\_\_ per hr.
- C. Repairs and Maintenance . . . . . \$ \_\_\_\_\_/hr.  
\_\_\_\_\_ % of depreciation
- D. Tires . . . . . \$ \_\_\_\_\_/hr.  
\$ \_\_\_\_\_ total cost @ hrs. of tire life
- E. Other (specify)

STEEL  
1" X 2', 4', 6' & 8' - @ 48<sup>00</sup>  
REPLACE EXH 160 HOURS -  
RATE - - - - .30/hr

BITS -  
1 3/4" (PER EXH STEEL) @  
PLUS RESHARPING - @ 26<sup>00</sup>  
REPLACE EXH 160 HOURS -  
RATE - - - - .15/hr

TOTAL - - .45/hr



9333.3 ~ PRODUCTION COSTS  
(Schedule 19)Schedule 18 Machine Operating RatesItem No. 17

I Description Air Compressor & Track Drill - 600 CFM  
Portable Compressor - 3 1/2" Track Mounted Drill  
(Includes Pipe, Hose & Fittings)  
Drill Steel & Bits Not Furnished w/ Rental Rate

II Rate

OwnershipRental

A. Fixed . . . \$ \_\_\_\_\_ /hr. \$ \_\_\_\_\_ /hr.

B. Operating . Compressor \$ 15.87/hr.  
Track Drill 11.16/hr.  
Steel & Bits 1.73/hr  
 Total . . . . . \$ \_\_\_\_\_ /hr. \$ 28.76/hr.  
 . . . . . \$ \_\_\_\_\_ /min. \$ 4.79/min.

III

Based on 1/15/71 FHA Schedule - Page 2  
 Investment

A. Acquisition (Freight Included)

Basic Machine . . . . . \$ \_\_\_\_\_

 Attachments \_\_\_\_\_  
 \_\_\_\_\_ \$ \_\_\_\_\_

B. Residual Value (total) . . . . . \$ \_\_\_\_\_

\_\_\_\_\_ based on \_\_\_\_\_ % of investment

for \_\_\_\_\_ hrs. of (useful life-first depreciable period)

\_\_\_\_\_ based on \_\_\_\_\_ % of investment.

for \_\_\_\_\_ hrs. of (useful life - first depreciable period)

C. Total Investment (depreciable value) \$ \_\_\_\_\_

D. Average Annual Investment . . . . . \$ \_\_\_\_\_ /year

9333.3 - PRODUCTION COSTS  
(Schedule 18)

- IV Fixed Cost (per hour of availability) . . . . . \$ \_\_\_\_\_/hr.  
(based on \_\_\_\_\_ hours of annual machine availability)
- A. Depreciation . . . . . \$ \_\_\_\_\_
- B. Insurance (rate 1.2% of ave. ann. invest.) \$ \_\_\_\_\_  
Annual cost of \$ \_\_\_\_\_
- C. Property Taxes (rate 2.4% of ave. ann. invest.) \$ \_\_\_\_\_  
Annual cost of \$ \_\_\_\_\_
- V Operating Cost (per hour of operation) . . . . . \$ \_\_\_\_\_
- A. Fuel (diesel - gas) . . . . . \$ \_\_\_\_\_/hr.  
\_\_\_\_\_ gal. per hour for \$ \_\_\_\_\_ per gal.
- B. Oil and Grease . . . . . \$ \_\_\_\_\_/hr.  
Lube oil - Crankcase \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Trans. & Drive \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Hyd. Oil \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Grease - \_\_\_\_\_ lbs per hr. @ \$ \_\_\_\_\_ per lbs.  
Filters - \$ \_\_\_\_\_ per hr.
- C. Repairs and Maintenance . . . . . \$ \_\_\_\_\_/hr.  
\_\_\_\_\_ % of depreciation
- D. Tires . . . . . \$ \_\_\_\_\_/hr.  
\$ \_\_\_\_\_ total cost @ hrs. of tire life
- E. Other (specify)

STEEL  
1 1/2" X 12' @ 76.00 REPLACE EACH 96 HOURS  
RATE - - - - - .79/hr

BITS  
3 1/2 CARBIDE BITS - @ 45.00 REPLACE EACH 48 HOURS.  
RATE - - - - - .94/hr

TOTAL - - - - - 1.73/hr.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

### Schedule 18 Machine Operating Rates

Item No. 18

I	Description
	<u>MOTOR SCRAPER</u>
	<u>TWO WHEEL PRIME MOVER -</u>
	<u>SINGLE ENGINE TRACTOR</u>
	<u>12 to 19 Cu. Yards (Struck Men) Capacity</u>

II Rate

## Ownership

Rental

A. Fixed . . . \$ \_\_\_\_\_/hr. \$ \_\_\_\_\_/hr.

B. Operating . \$ /hr. \$ /hr.

Total . . . . . \$ \_\_\_\_\_/hr.      \$ 32.78/hr.  
 . . . . . \$ \_\_\_\_\_/min.      \$ .546/min.

III

Based on 4/15/71 FHA Schedule  
Investment  
A. Acquisition (Freight Included)

A. Acquisition (Freight Included)

Basic Machine . . . . . \$

## Attachments

B. Residual Value (total) . . . . . \$

based on % of investment

for hrs. of (useful life-first depreciable period)

based on % of investment.

for hrs. of (useful life - first depreciable period)

C. Total Investment (depreciable value) \$

D. Average Annual Investment . . . . . \$ /year

9333.3 - PRODUCTION COSTS  
(Schedule 18)

- IV Fixed Cost (per hour of availability) . . . . . \$ \_\_\_\_\_/hr.  
(based on \_\_\_\_\_ hours of annual machine availability)
- A. Depreciation . . . . . \$ \_\_\_\_\_
- B. Insurance (rate 1.2% of ave. ann. invest.) \$ \_\_\_\_\_  
Annual cost of \$ \_\_\_\_\_
- C. Property Taxes (rate 2.4% of ave. ann. invest.) \$ \_\_\_\_\_  
Annual cost of \$ \_\_\_\_\_
- V Operating Cost (per hour of operation) . . . . . \$ \_\_\_\_\_
- A. Fuel (diesel - gas) . . . . . \$ \_\_\_\_\_/hr.  
\_\_\_\_\_ gal. per hour for \$ \_\_\_\_\_ per gal.
- B. Oil and Grease . . . . . \$ \_\_\_\_\_/hr.  
Lube oil - Crankcase \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Trans. & Drive \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Hyd. Oil \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Grease - \_\_\_\_\_ lbs per hr. @ \$ \_\_\_\_\_ per lbs.  
Filters - \$ \_\_\_\_\_ per hr.
- C. Repairs and Maintenance . . . . . \$ \_\_\_\_\_/hr.  
\_\_\_\_\_ % of depreciation
- D. Tires . . . . . \$ \_\_\_\_\_/hr.  
\$ \_\_\_\_\_ total cost @ hrs. of tire life
- E. Other (specify)

*All costs included in Rental Rate*

VI Remarks -



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Schedule 18 Machine Operating Rates

Item No. 19

I Description SHOVEL - POWER  
3/4 CUBIC YARD CAPACITY

II Rate

Ownership

Rental

A. Fixed . . . \$ \_\_\_\_\_ /hr. \$ \_\_\_\_\_ /hr.

B. Operating . \$ \_\_\_\_\_ /hr. \$ \_\_\_\_\_ /hr.

Total . . . . . \$ \_\_\_\_\_ /hr. \$ 22.83 /hr.  
 . . . . . \$ \_\_\_\_\_ /min. \$ .381 /min.

III

*Based on 1/5/71 FITA SCHEDULE - PAGE 10*  
Investment

A. Acquisition (Freight Included)

Basic Machine . . . . . \$ \_\_\_\_\_

Attachments \_\_\_\_\_

\_\_\_\_\_ \$ \_\_\_\_\_

B. Residual Value (total) . . . . . \$ \_\_\_\_\_

\_\_\_\_\_ based on \_\_\_\_\_ % of investment

for \_\_\_\_\_ hrs. of (useful life-first depreciable period)

\_\_\_\_\_ based on \_\_\_\_\_ % of investment.

for \_\_\_\_\_ hrs. of (useful life - first depreciable period)

C. Total Investment (depreciable value) \$ \_\_\_\_\_

D. Average Annual Investment . . . . . \$ \_\_\_\_\_ /year

9333.3 - PRODUCTION COSTS  
(Schedule 18)

- IV Fixed Cost (per hour of availability) . . . . . \$ \_\_\_\_\_/hr.  
(based on \_\_\_\_\_ hours of annual machine availability)
- A. Depreciation . . . . . \$ \_\_\_\_\_
- B. Insurance (rate 1.2% of ave. ann. invest.) \$ \_\_\_\_\_  
Annual cost of \$ \_\_\_\_\_
- C. Property Taxes (rate 2.4% of ave. ann. invest.) \$ \_\_\_\_\_  
Annual cost of \$ \_\_\_\_\_
- V Operating Cost (per hour of operation) . . . . . \$ \_\_\_\_\_
- A. Fuel (diesel - gas) . . . . . \$ \_\_\_\_\_/hr.  
\_\_\_\_\_ gal. per hour for \$ \_\_\_\_\_ per gal.
- B. Oil and Grease . . . . . \$ \_\_\_\_\_/hr.  
Lube oil - Crankcase \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Trans. & Drive \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Hyd. Oil \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Grease - \_\_\_\_\_ lbs per hr. @ \$ \_\_\_\_\_ per lbs.  
Filters - \$ \_\_\_\_\_ per hr.
- C. Repairs and Maintenance . . . . . \$ \_\_\_\_\_/hr.  
\_\_\_\_\_ % of depreciation
- D. Tires . . . . . \$ \_\_\_\_\_/hr.  
\$ \_\_\_\_\_ total cost @ hrs. of tire life
- E. Other (specify)

*All costs  
Included  
in  
Perman  
Rate*

VI Remarks -



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Schedule 18 Machine Operating Rates

Item No. 20

I Description Dump TRUCK - Normal Duty  
2 OR 3 AXLE - GASOLINE OR DIESEL (HIGHWAY)  
8 to 12 CUBIC YARD (STRUCK MEASURE)

II Rate

Ownership

Rental

A. Fixed . . . \$ \_\_\_\_\_ /hr. \$ \_\_\_\_\_ /hr.

B. Operating . \$ \_\_\_\_\_ /hr. \$ \_\_\_\_\_ /hr.

Total . . . . . \$ \_\_\_\_\_ /hr. \$ 13.51 /hr.  
" " " " " \$ \_\_\_\_\_ /min. \$ .225 /min.

III

Based on 1/15/71 FHA Schedule  
Investment PAGE 12

A. Acquisition (Freight Included)

Basic Machine . . . . . \$ \_\_\_\_\_

Attachments \_\_\_\_\_

\_\_\_\_\_ \$ \_\_\_\_\_

B. Residual Value (total) . . . . . \$ \_\_\_\_\_

\_\_\_\_\_ based on \_\_\_\_\_ % of investment

for \_\_\_\_\_ hrs. of (useful life-first depreciable period)

\_\_\_\_\_ based on \_\_\_\_\_ % of investment.

for \_\_\_\_\_ hrs. of (useful life - first depreciable period)

C. Total Investment (depreciable value) \$ \_\_\_\_\_

D. Average Annual Investment . . . . . \$ \_\_\_\_\_ /year

9333.3 - PRODUCTION COSTS  
(Schedule 18)

- IV Fixed Cost (per hour of availability) . . . . . \$ \_\_\_\_\_/hr.  
(based on \_\_\_\_\_ hours of annual machine availability)
- A. Depreciation . . . . . \$ \_\_\_\_\_
- B. Insurance (rate 1.2% of ave. ann. invest.) \$ \_\_\_\_\_  
Annual cost of \$ \_\_\_\_\_
- C. Property Taxes (rate 2.4% of ave. ann. invest.) \$ \_\_\_\_\_  
Annual cost of \$ \_\_\_\_\_
- V Operating Cost (per hour of operation) . . . . . \$ \_\_\_\_\_
- A. Fuel (diesel - gas) . . . . . \$ \_\_\_\_\_/hr.  
\_\_\_\_\_ gal. per hour for \$ \_\_\_\_\_ per gal.
- B. Oil and Grease . . . . . \$ \_\_\_\_\_/hr.  
Lube oil - Crankcase \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Trans. & Drive \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Hyd. Oil \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Grease - \_\_\_\_\_ lbs per hr. @ \$ \_\_\_\_\_ per lbs.  
Filters - \$ \_\_\_\_\_ per hr.
- C. Repairs and Maintenance . . . . . \$ \_\_\_\_\_/hr.  
\_\_\_\_\_ % of depreciation
- D. Tires . . . . . \$ \_\_\_\_\_/hr.  
\$ \_\_\_\_\_ total cost @ hrs. of tire life
- E. Other (specify)

*All Costs  
Incurred  
in  
Dev'tm Phase*

VI Remarks -



9333.3 - PRODUCTION COSTS  
(Schedule 19)

### Schedule 18 Machine Operating Rates

Item No. 21

1 Description FORD FOLKER - VIBRATORY  
GASOLINE OR DIESEL  
27 to 36 HP

## II Rate

## Ownership

## Rental

A. Fixed . . . \$ \_\_\_\_\_ /hr. \$ \_\_\_\_\_ /hr.

B. Operating . \$ /hr. \$ /hr.

Total . . . . . \$ \_\_\_\_\_/hr.      \$ 10.58/hr.  
 . . . . . \$ \_\_\_\_\_/min.      \$ .176/min.

III

Based on 1/15/71 FHA SCHEDULE -  
Investment

A. Acquisition (Freight Included)

Basic Machine . . . . . \$ \_\_\_\_\_

## Attachments

B. Residual Value (total) . . . . . \$

based on % of investment

for hrs. of (useful life-first depreciable period)

based on % of investment.

for hrs. of (useful life - first depreciable period)

C. Total Investment (depreciable value) \$

D. Average Annual Investment . . . . . \$ /year

9333.3 - PRODUCTION COSTS  
(Schedule 18)

- IV Fixed Cost (per hour of availability) . . . . . \$ \_\_\_\_\_/hr.  
(based on \_\_\_\_\_ hours of annual machine availability)
- A. Depreciation . . . . . \$ \_\_\_\_\_
- B. Insurance (rate 1.2% of ave. ann. invest.) \$ \_\_\_\_\_  
Annual cost of \$ \_\_\_\_\_
- C. Property Taxes (rate 2.4% of ave. ann. invest.) \$ \_\_\_\_\_  
Annual cost of \$ \_\_\_\_\_
- V Operating Cost (per hour of operation) . . . . . \$ \_\_\_\_\_
- A. Fuel (diesel - gas) . . . . . \$ \_\_\_\_\_/hr.  
\_\_\_\_\_ gal. per hour for \$ \_\_\_\_\_ per gal.
- B. Oil and Grease . . . . . \$ \_\_\_\_\_/hr.  
Lube oil - Crankcase \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Trans. & Drive \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Hyd. Oil \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Grease - \_\_\_\_\_ lbs per hr. @ \$ \_\_\_\_\_ per lbs.  
Filters - \$ \_\_\_\_\_ per hr.
- C. Repairs and Maintenance . . . . . \$ \_\_\_\_\_/hr.  
\_\_\_\_\_ % of depreciation
- D. Tires . . . . . \$ \_\_\_\_\_/hr.  
\$ \_\_\_\_\_ total cost @ hrs. of tire life
- E. Other (specify)

*All Costs Included in Rental Rate*

VI Remarks -



(Schedule 19)

### Schedule 18 Machine Operating Rates

Item No. 22

I	Description	<u>Long Kottor</u>	<u>GRD</u>
		<u>16 Ton</u>	

II Rate

## Ownership

## Rental

A. Fixed . . . \$ \_\_\_\_\_ /hr. \$ \_\_\_\_\_ /hr.

B. Operating . \$ \_\_\_\_\_/hr. \$ \_\_\_\_\_/hr.

Total . . . . . \$ \_\_\_\_\_/hr.      \$ 8.97/hr.  
 . . . . . \$ \_\_\_\_\_/min.      \$ .150/min.

III

Based on 1/5/71 FITA SCHEDULE  
Investment

A. Acquisition (Freight Included)

Basic Machine . . . . . \$

Attachments \_\_\_\_\_ \$

B. Residual Value (total) . . . . . \$

\_\_\_\_\_ based on \_\_\_\_\_ % of investment  
for \_\_\_\_\_ hrs. of (useful life-first depreciable period)

based on % of investment.

for        hrs. of (useful life - first depreciable period)

C. Total Investment (depreciable value) \$

D. Average Annual Investment . . . . . \$ /year

9333.3 - PRODUCTION COSTS  
(Schedule 18)

- IV Fixed Cost (per hour of availability) . . . . . \$ \_\_\_\_\_/hr.  
(based on \_\_\_\_\_ hours of annual machine availability)
- A. Depreciation . . . . . \$ \_\_\_\_\_
- B. Insurance (rate 1.2% of ave. ann. invest.) \$ \_\_\_\_\_  
Annual cost of \$ \_\_\_\_\_
- C. Property Taxes (rate 2.4% of ave. ann. invest.) \$ \_\_\_\_\_  
Annual cost of \$ \_\_\_\_\_
- V Operating Cost (per hour of operation) . . . . . \$ \_\_\_\_\_
- A. Fuel (diesel - gas) . . . . . \$ \_\_\_\_\_/hr.  
\_\_\_\_\_ gal. per hour for \$ \_\_\_\_\_ per gal.
- B. Oil and Grease . . . . . \$ \_\_\_\_\_/hr.  
Lube oil - Crankcase \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Trans. & Drive \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Hyd. Oil \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Grease - \_\_\_\_\_ lbs per hr. @ \$ \_\_\_\_\_ per lbs.  
Filters - \$ \_\_\_\_\_ per hr.
- C. Repairs and Maintenance . . . . . \$ \_\_\_\_\_/hr.  
\_\_\_\_\_ % of depreciation
- D. Tires . . . . . \$ \_\_\_\_\_/hr.  
\$ \_\_\_\_\_ total cost @ hrs. of tire life
- E. Other (specify)

*All costs included in per hr rate*

VI Remarks -



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Schedule 18 Machine Operating Rates

Item No. 23

I Description MOTOR GRADER  
CATERPILLER NO. 12F W/ CAB  
COMPLETE - HYDRAULIC SHOES/HFT - MOLDING BOARD  
SCARIFIERS, LIGHTS & HD CUTTING EDGE

II Rate

	<u>Ownership</u>	<u>Rental</u> <sup>1/</sup>
A. Fixed ...	\$ <u>2.65</u> /hr.	\$ _____ /hr.
B. Operating	\$ <u>2.78</u> /hr.	\$ _____ /hr.
Total . . . . .	\$ <u>5.43</u> /hr.	\$ _____ /hr.
	\$ <u>0.091</u> /min.	\$ _____ /min.

1/ Based on schedule \_\_\_\_\_

III Investment

A. Acquisition (freight included)

Basic Machine . . . . . \$ 43762

Attachments Complete

\_\_\_\_\_ \$ \_\_\_\_\_

B. Residual Value (total) . . . . . \$ 10940

Form Machine based on 25 % of investment

for 16000 hrs. of (useful life-first depreciable period)

\_\_\_\_\_ based on \_\_\_\_\_ % of investment.

for \_\_\_\_\_ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) \$ 32822

D. Average Annual Investment . . . . . \$ 28992 /yr.

9333.3 - PRODUCTION COSTS  
(Schedule 18)

IV Fixed Cost (per hour of availability . . . . . \$ 2.65 /hr.  
(based on 1600 hours of annual machine availability)

A. Depreciation . . . . . \$ 2.05

B. Insurance (rate 1.0 % of ave. ann. invest.) \$ 0.18  
Annual cost of \$ 290.

C. Property Taxes (rate 2.3 % of ave. ann. invest) \$ 0.42  
Annual cost of \$ 667.

V Operating Cost(per hour of operation) . . . . . \$ 2.78

A. Fuel (diesel - gas) . . . \$ .99 /hr.  
4.6 gal. per hour for \$ .215 per gal.

\* B. Oil and Grease . . . . . \$ .12 /hr.  
Lube oil - Crankcase \_\_\_ gph @ \$ \_\_\_ per gal.  
Trans. & Drive \_\_\_ gph @ \$ \_\_\_ per gal.  
Hyd. Oil \_\_\_ gph @ \$ \_\_\_ per gal.  
Grease- \_\_\_ lbs. per hr. @ \$ \_\_\_ per lbs.  
Filters-\$ \_\_\_ per hr.

\* C. Repairs and Maintenance . . . . . \$ 1.25 /hr.  
\_\_\_ % of depreciation

D. Tires . . . . . \$ .42 /hr.  
\$ 6720 total cost @ "16000" hrs. of tire life.

E. Other (specify)

VI Remarks - 1/  
(Note: All costs are included in rental rates.)

\* 12.5% OF Fuel cost - Based on Equipment Company Recommendation -  
\*\* MANUFACTURER'S RECOMMENDATION - INCLUDES BITS - OVERLAYS  
CUTTING EDGES, SCARIFIERS, ETC -



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Schedule 18 Machine Operating Rates

Item No. 23(A)

I Description MOTOR GENERATOR  
W/ POWER SHFT  
BTWN 27000 & 31000 lbs.

II Rate

Ownership

Rental

A. Fixed . . . \$ \_\_\_\_ /hr. \$ \_\_\_\_ /hr.

B. Operating . \$ \_\_\_\_ /hr. \$ \_\_\_\_ /hr.

Total . . . . . \$ \_\_\_\_ /hr. \$ 19.78 /hr.  
..... \$ \_\_\_\_ /min. \$ .330 /min.

III

BASED ON 1/15/71 FHA SCHEDULE  
Investment  
PAGE 4

A. Acquisition (Freight Included)

Basic Machine . . . . . \$ \_\_\_\_

Attachments \_\_\_\_\_

\_\_\_\_\_ \$ \_\_\_\_

B. Residual Value (total) . . . . . \$ \_\_\_\_

\_\_\_\_\_ based on \_\_\_\_ % of investment

for \_\_\_\_ hrs. of (useful life-first depreciable period)

\_\_\_\_\_ based on \_\_\_\_ % of investment.

for \_\_\_\_ hrs. of (useful life - first depreciable period)

C. Total Investment (depreciable value) \$ \_\_\_\_

D. Average Annual Investment . . . . . \$ \_\_\_\_ /year

9333.3 - PRODUCTION COSTS  
(Schedule 18)

- IV Fixed Cost (per hour of availability) . . . . . \$ \_\_\_\_\_/hr.  
(based on \_\_\_\_\_ hours of annual machine availability)
- A. Depreciation . . . . . \$ \_\_\_\_\_
- B. Insurance (rate 1.2% of ave. ann. invest.) \$ \_\_\_\_\_  
Annual cost of \$ \_\_\_\_\_
- C. Property Taxes (rate 2.4% of ave. ann. invest.) \$ \_\_\_\_\_  
Annual cost of \$ \_\_\_\_\_
- V Operating Cost (per hour of operation) . . . . . \$ \_\_\_\_\_
- A. Fuel (diesel - gas) . . . . . \$ \_\_\_\_\_/hr.  
\_\_\_\_\_ gal. per hour for \$ \_\_\_\_\_ per gal.
- B. Oil and Grease . . . . . \$ \_\_\_\_\_/hr.  
Lube oil - Crankcase \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Trans. & Drive \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Hyd. Oil \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Grease - \_\_\_\_\_ lbs per hr. @ \$ \_\_\_\_\_ per lbs.  
Filters - \$ \_\_\_\_\_ per hr.
- C. Repairs and Maintenance . . . . . \$ \_\_\_\_\_/hr.  
\_\_\_\_\_ % of depreciation
- D. Tires . . . . . \$ \_\_\_\_\_/hr.  
\$ \_\_\_\_\_ total cost @ hrs. of tire life
- E. Other (specify)

*All costs included in Rental Rate*

VI Remarks -



9333.3 - PRODUCTION COSTS  
(Schedule 19)Schedule 18 Machine Operating RatesItem No. 24

I Description LOG TRUCK w/ TRAILER -  
WHITE - WESTERN STAR MODEL 4964WD - w/ PEERLESS  
TRAILER - 350 HP CUMMINS DIESEL  
INSTALLED BUNKS & ELECTRIC SCALES -

II Rate

	<u>Ownership</u>	<u>Rental</u> <sup>1/</sup>
A. Fixed ...	\$ <u>4.15</u> /hr.	\$ _____ /hr.
B. Operating	\$ <u>5.53</u> /hr.	\$ _____ /hr.
Total . . . . .	\$ <u>9.68</u> /hr.	\$ _____ /hr.
	\$ <u>0.161</u> /min.	\$ _____ /min.

1/ Based on schedule \_\_\_\_\_

III Investment

A. Acquisition (freight included)

Basic Machine . . . . . \$ 27220Attachments TRAILER\_\_\_\_\_ \$ 8500B. Residual Value (total) . . . . . \$ 8930Trade & Triples based on 25 % of investmentfor 10 000 hrs. of (useful life-first depreciable  
period)

\_\_\_\_\_ based on \_\_\_\_\_ % of investment.

for \_\_\_\_\_ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) \$ 26790D. Average Annual Investment . . . . . \$ 24468 /yr.

9333.3 - PRODUCTION COSTS  
(Schedule 18)

IV Fixed Cost (per hour of availability . . . . . \$ 4.15 /hr.  
(based on 2000 hours of annual machine availability)

A. Depreciation . . . . . \$ 2.68

B. Insurance <sup>COMMERCIAL TRAIL RATE</sup> (rate % of ave. ann. invest.) \$ 0.72  
Annual cost of \$ 1437 .

C. <sup>LICENSE FEE - DMV</sup> Property Taxes (rate % of ave. ann. invest) \$ 0.75  
Annual cost of \$ 1494 .

V Operating Cost(per hour of operation) . . . . . \$ 5.53

\* A. Fuel (diesel - gas) . . . \$ 1.59 /hr.  
6.5 gal. per hour for \$ .245 per gal.

\*\* B. Oil and Grease . . . . . \$ .19 /hr.  
Lube oil - Crankcase \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Trans. & Drive \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Hyd. Oil \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Grease- \_\_\_\_\_ lbs. per hr. @ \$ \_\_\_\_\_ per lbs.  
Filters- \$ \_\_\_\_\_ per hr.

\*\*\* C. Repairs and Maintenance . . . . . \$ 2.10 /hr.  
75 % of depreciation

D. Tires . . . . . \$ 1.65 /hr.  
\$16512 total cost @ 10000 \* hrs. of tire life.

E. Other (specify)

VI Remarks - <sup>1/</sup> (Note: All costs are included in rental rates.)

\* - BASED ON 75% USE ON PUBLIC HIGHWAY.  
\*\* EQUIPMENT, COMPANY RECOMMENDED RATE  
\*\*\* MANUFACTURES RECOMMENDATION -



9333.3 - PRODUCTION COSTS  
(Schedule 19)Schedule 18 Machine Operating RatesItem No. 25

I Description CREW CAR  
GMC - 3/4 TON - 9 PASSENGER CARRYALL  
'Complete'

II Rate

	<u>Ownership</u>	<u>Rental</u> <sup>1/</sup>
A. Fixed ...	\$ <u>.42</u> /hr.	\$ _____ /hr.
B. Operating	\$ <u>.78</u> /hr.	\$ _____ /hr.
Total . . . . .	\$ <u>1.20</u> /hr.	\$ _____ /hr.
	\$ <u>0.020</u> /min.	\$ _____ /min.

<sup>1/</sup> Based on schedule \_\_\_\_\_

III Investment

A. Acquisition (freight included)

Basic Machine . . . . . \$ 3956Attachments Complete

\_\_\_\_\_ \$ \_\_\_\_\_

B. Residual Value (total) . . . . . \$ 791TOTAL based on 20 % of investmentfor 10000 hrs. of (useful life-first depreciable  
period)

\_\_\_\_\_ based on \_\_\_\_\_ % of investment.

for \_\_\_\_\_ hrs. of (useful life-first depreciable period)

C. Total Investment (depreciable value) \$ 3165D. Average Annual Investment . . . . . \$ 2627 /yr.

9333.3 - PRODUCTION COSTS  
(Schedule 18)

IV Fixed Cost (per hour of availability . . . . . \$ .42 /hr.  
(based on 1600 hours of annual machine availability)

A. Depreciation . . . . . \$ .32

B. Insurance <sup>COMMERCIAL TRUCK RATE</sup>  
(rate \_\_\_\_\_ % of ave. ann. invest.) \$ 0.09  
Annual cost of \$ \_\_\_\_\_.

C. <sup>LICENSE FEE - DMV.</sup>  
~~Property Taxes~~ (rate \_\_\_\_\_ % of ave. ann. invest.) \$ 0.01  
Annual cost of \$ \_\_\_\_\_.

V Operating Cost(per hour of operation) . . . . . \$ .78

A. Fuel (diesel - gas) . . . \$ .30 /hr.  
.875 gal. per hour for \$ .342 per gal.

\*B. Oil and Grease . . . . . \$ .05 /hr.  
Lube oil - Crankcase \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Trans. & Drive \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Hyd. Oil \_\_\_\_\_ gph @ \$ \_\_\_\_\_ per gal.  
Grease- \_\_\_\_\_ lbs. per hr. @ \$ \_\_\_\_\_ per lbs.  
Filters-\$ \_\_\_\_\_ per hr.

C. Repairs and Maintenance . . . . . \$ .29 /hr.  
90 % of depreciation

D. Tires . . . . . \$ .14 /hr.  
\$ 1450 total cost @ 10000 " hrs. of tire life.

E. Other (specify)

VI <sup>1/</sup>  
Remarks - (Note: All costs are included in rental rates.)

\* BASED ON 15% OF FUEL COST.



~~Production~~

operation Costs





9333.3 - PRODUCTION COSTS  
(Schedule 19)

C. Operating Costs

1. Procedure. The costs of various segments of each operation are combined to determine the total costs of performing this function. The fixed and operating costs rental rate of each machine are included. The wages for each employee contributing to the operation are added, along with the additional labor-related costs and cost of transportation to the job. In addition, ten percent of the total of all the costs is included to cover general and administrative costs, i.e., the costs of clerical work, accounting services, administration and overhead, etc.

2. Operating Cost Computations. The individual computations are summarized below. They are grouped by the major functions, and referenced to specific cost tables in the Schedule.





9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

a. Activity - FALLING & BUCKING - WESTERN OREGON

(1) Operations - MERCHANTABLE & UNMERCHANTABLE TREES & SNAGS

Reference for Cost Table ILLUSTRATION 1- TABLE 143

I Determining Hourly Cost

		<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A.	<u>Machine Rates</u> Machine/Time			
1.	<u>CHAIN SAW</u>	<u>.31</u>	<u>.79</u>	<u>1.10</u>
2.				
3.				
4.				
5.				
6.				
Total Machine Rate . . . .		\$	<u>1.10</u>	

B.	<u>Wage Rates (Adjusted Hourly Rate)</u> Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1.	<u>Faller Buckers</u>	<u>10.97</u>	<u>10.97</u>
2.			
3.			

(C-2. a-1)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_

5. \_\_\_\_\_

6. \_\_\_\_\_

7. \_\_\_\_\_

8. \_\_\_\_\_

Total Wage Rate \$ 10.97

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 12.07 X 10% . . . . . \$ 1.21

D. Total Costs . . . . . \$ 13.28

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	7.6	X	1.080	=	.082	
<u>Oil and Gas</u>	1.5	X	2.452	=	.037	
<u>Wages</u>	90.9	X	1.074	=	.976	
_____		X		=		Schedule 18 Cost
	100.0%		Weighted Index	=	1.095	X \$ 13.28
						Schedule 19 Cost = \$ 14.54/hr.
						\$ .242/min.

III Misc. Add'l Costs/Adjustments

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

a. Activity - FALLING & BUCKING - WESTERN OREGON

(2) Operations - COMMERCIAL THINNING

Reference for Cost Table ILLUSTRATION 1 TABLE 5

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>CATSKIN SAW</u>	<u>.31</u>	<u>.79</u>	<u>1.10</u>
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____

Total Machine Rate . . . . \$ \_\_\_\_\_

	<u>Hour Rate</u>	<u>Total</u>
B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time		
1. <u>FALLER - BUCKER</u>	<u>10.97</u>	<u>10.97</u>
2. _____	_____	_____
3. _____	_____	_____

(C-2.a-2)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_

5. \_\_\_\_\_

6. \_\_\_\_\_

7. \_\_\_\_\_

8. \_\_\_\_\_

Total Wage Rate                      \$ 10.97

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 12.07 X 10% . . . . . \$ 1.21

D. Total Costs . . . . . \$ 13.28

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>7.6</u>	X	<u>1.080</u>	=	<u>.082</u>	
<u>Oil and Gas</u>	<u>1.5</u>	X	<u>2.452</u>	=	<u>.037</u>	
<u>Wages</u>	<u>90.9</u>	X	<u>1.074</u>	=	<u>.976</u>	
		X		=		Schedule 18 Cost
	100.0%		Weighted Index	=	<u>1.095</u>	X \$ <u>13.28</u>

Schedule 19 Cost = \$ 14.54  
1.6 (see below)  
 \$ 23.26/hr.  
 \$ 0.388/min.

III Misc. Add'l Costs/Adjustments

Delay time factor for falling and bucking

from PNW 14 is .596

Adjusted falling & bucking cost /hr. x 1.6 =      /hr.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

a. Activity - FALLING & BUCKING - EASTERN OREGON

(3) Operations - UNMERCHANTABLE TREES & SNAGS -

Reference for Cost Table ILLUSTRATION 1 TABLE 4

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>CHAINSAW</u>	<u>.31</u>	<u>.79</u>	<u>1.10</u>
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____

Total Machine Rate . . . . \$ 1.10

	<u>Hour Rate</u>	<u>Total</u>
B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time		
* 1. <u>Faller-Bucker</u>	<u>8.84</u>	<u>8.84</u>
2. _____	_____	_____
3. _____	_____	_____

(C-2.a-3)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
 5. \_\_\_\_\_  
 6. \_\_\_\_\_  
 7. \_\_\_\_\_  
 8. \_\_\_\_\_

Total Wage Rate

\$ 8.84 \*

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 9.94 X 10% . . . . . \$ 0.99

D. Total Costs . . . . . \$ 10.93II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	9.3	X	1.080	=	.100	
<u>Oil and Gas</u>	1.8	X	2.452	=	.045	
<u>Wages</u>	88.9	X	1.074	=	.955	
		X		=		Schedule 18 Cost
	100.0%	Weighted Index		=	1.100	X \$ 10.93
						Schedule 19 Cost = \$ 12.02/hr.
						\$ 0.200/min.

III Misc. Add'l Costs/Adjustments



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - Logging - Grading - Loading - Western Oregon

(1) Operations - EQUIPMENT MOVE - IN - (1) LIGHT YARDING TRACTOR

Reference for Cost Table ILLUSTRATION 2 - TABLE 1

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>TRACTOR - CAT D40</u> <u>2 HOUR DELAY</u>	<u>2 x 1.98</u>		<u>3.96</u>
2. <u>MEDIUM WEIGHT FLAT BED FOR</u> <u>HAULING TRACTOR - 3 HOUR</u> <u>RENTAL RATE FROM FHA SCHEDULE</u>	<u>3 x 6.56</u>		<u>19.68</u>
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____

Total Machine Rate . . . . \$ 23.64

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1. <u>SMALL TRACTOR OPERATOR</u>	<u>3 x 7.90</u>	<u>23.70</u>
2. _____	_____	_____
3. _____	_____	_____

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 23.70

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 47.35 X 10% . . . . . \$ 4.73

D. Total Costs . . . . . 52.07

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
1971	33.9		1.132	=	.384	
<u>Equipment</u> 1972	8.4	X	1.080	=	.091	
<u>Oil and Gas</u> 1971	7.6	X	2.515	=	.191	
<u>Wages</u>	50.1	X	1.074	=	.538	
		X		=		Schedule 18 Cost
100.0% Weighted Index =					1.204	X \$ 52.07
					Schedule 19 Cost =	\$ 62.69
						\$ _____

III Misc. Add'l Costs/Adjustments

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - Pigging, Grading & Loading - Western Oregon

Operations - EQUIPMENT MOVE-IN (2) GRADING TRACTOR

Reference for Cost Table ILLUSTRATION 2 - TABLE 1

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>TRACTOR - CAT D7F</u> <u>2 HOUR DELAY</u> <u>(49000 lbs)</u>	<u>2 x 6.24</u>		<u>12.48</u>
2. <u>LOWBOY - FOR HAULING TRACTOR</u> <u>PUC - RATE - .20/CWT.</u> <u>49000 lbs x .20/CWT -</u>			<u>107.80</u>
3. <u>LOWBOY - EMPTY MILEAGE CHARGE</u> <u>PUC RATE -</u> <u>60 MILES -</u>			<u>48.20</u>
4. <u>FLAG CAR - COMMERCIAL RATE</u> <u>70 MILES -</u>			<u>56.30</u>
5. _____			
6. _____			
Total Machine Rate . . . . \$			<u>224.78</u>

B. Wage Rates (Adjusted Hourly Rate)  
Crew Position/Time

	<u>Hour Rate</u>	<u>Total</u>
1. <u>TRACTOR OPERATOR</u>	<u>2 x 8.25</u>	<u>17.50</u>
2. _____		
3. _____		

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 17.50

C. General and Administrative Costs  
10% of Machine and Wage Rates

1/ \$ 185.98 X 10% . . . . . \$ 18.60

D. Total Costs . . . . . \$ 260.88

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>5.3</u>	X	<u>1.080</u>	=	<u>.057</u>	
<u>Oil and Gas</u>	<u>0.0</u>	X		=		
<u>Wages</u>	<u>7.4</u>	X	<u>1.074</u>	=	<u>.080</u>	
<u>Transportation</u>	<u>87.3</u>	X	<u>1.229</u>	=	<u>1.073</u>	Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.210</u>	X	\$ <u>260.88</u>
				Schedule 19 Cost	=	\$ <u>315.66</u>
						\$ _____

III Misc. Add'l Costs/Adjustments

1/ G & A Cost not allowed on Cost of Flag Car.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - RUBBER YARDING & LOADING - WESTERN OREGON  
Operations - EQUIPMENT MOVE-IN (3) RUBBER TIRE 4 WHEEL SKIDDER  
Reference for Cost Table ILLUSTRATION 2 TABLE 1

I Determining Hourly Cost

		<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A.	<u>Machine Rates</u> Machine/Time			
1.	<u>4 WHEEL SKIDDER - JOHN DEERE</u> <u>3 HOURS MACHINE TIME</u>	<u>3 X 1.92</u>	<u>3 X 3.81</u>	<u>17.19</u>
2.	<u>ON-HIGHWAY TRIP PERMIT</u> <u>DMU-</u>	<u>      </u>	<u>      </u>	<u>5.00</u>
3.	<u>      </u>	<u>      </u>	<u>      </u>	<u>      </u>
4.	<u>      </u>	<u>      </u>	<u>      </u>	<u>      </u>
5.	<u>      </u>	<u>      </u>	<u>      </u>	<u>      </u>
6.	<u>      </u>	<u>      </u>	<u>      </u>	<u>      </u>
Total Machine Rate . . . .		\$	<u>22.19</u>	

B.	<u>Wage Rates (Adjusted Hourly Rate)</u> Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1.	<u>TRACTOR OPERATOR (SMALL)</u>	<u>3 X 7.90</u>	<u>23.70</u>
2.	<u>      </u>	<u>      </u>	<u>      </u>
3.	<u>      </u>	<u>      </u>	<u>      </u>

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 23.70

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 45.89 X 10% . . . . . \$ 4.59

D. Total Costs . . . . . \$ 50.48

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	43.6	X	1.080	=	.471	
<u>Oil and Gas</u>	4.8	X	2.452	=	.118	
<u>Wages</u>	51.6	X	1.074	=	.554	
_____		X		=		Schedule 18 Cost
	100.0%	Weighted Index	=	1.143	X	\$ 50.48
				Schedule 19 Cost	=	\$ 57.70
						\$ _____

III Misc. Add'l Costs/Adjustments

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - RIGGING YARDING & LOADING - WESTERN OREGON

Operations - EQUIPMENT MOVE-IN (4) MEDIUM YARDS

Reference for Cost Table ILLUSTRATION 2 TABLE 1

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>YARDER - SKAGIT Bu 80C</u> <u>6 HOUR DELAY</u> <u>32000 lbs -</u>	<u>6 x 3.52</u>		<u>21.12</u>
2. <u>LOWBOY FOR HAULING YARDER</u> <u>PUC RATE - .275 /CWT</u> <u>.275/CWT x 32000 lbs -</u>			<u>91.20</u>
3. <u>LOWBOY - EMPTY MILEAGE CHARGE</u> <u>PUC RATE</u> <u>60 MILES</u>			<u>48.20</u>
4. <u>FRAG RATE - COMMERCIAL RATE</u> <u>70 MILES</u>			<u>56.30</u>
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$			<u>216.82</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1. <u>YARDING ENGINEER -</u>	<u>2 x 8.88</u>	<u>17.76</u>
2. _____	_____	_____
3. _____	_____	_____

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 17.76

C. General and Administrative Costs  
10% of Machine and Wage Rates

1/ \$ 178.28 X 10% . . . . . \$ 17.83

D. Total Costs . . . . . \$ 252.41

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
Equipment	9.2	X	1.080	=	.099	
Oil and Gas		X		=		
Wages	7.7	X	1.074	=	.083	
Transportation	83.1	X	1.229	=	1.021	Schedule 18 Cost
	100.0%	Weighted Index	=	1.203	X	\$ 252.41
						Schedule 19 Cost = \$ 303.65
						\$

III Misc. Add'l Costs/Adjustments

1/ G & A Cost not allowed on allowance for flag car.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - Logging, Yarding & Loading - Western Oregon  
Operations - EQUIPMENT MOVE-IN (5) 65' PORTABLE TOWER YARDER  
Reference for Cost Table ILLUSTRATION 2 TABLE 1

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>TOWER/YARDER - 65' TOWER</u> <u>4 HOUR DELAY</u>	<u>4x 7.70</u>		<u>30.80</u>
2. <u>LOGGING TRUCK &amp; TRAILER FOR</u> <u>HAULING TOWER/YARDER -</u> <u>2 HOUR DELAY &amp; MOUNTING TIME</u>	<u>4x 4.15</u>	<u>2x 5.53</u>	<u>27.66</u>
3. <u>PICK UP - COMMERCIAL RATE</u> <u>70 MILE</u>			<u>56.30</u>
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$			<u>114.76</u>

B. <u>Wage Rates (Adjusted Hourly Rate)</u> Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1. <u>YARDING ENGINEER</u>	<u>4x 8.88</u>	<u>35.52</u>
2. <u>LOG TRUCK DRIVER</u>	<u>4x 6.62</u>	<u>26.48</u>
3. _____	_____	_____

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 62.00

C. General and Administrative Costs  
10% of Machine and Wage Rates

1/ \$ 120.46 X 10% . . . . . \$ 12.05

D. Total Costs . . . . . \$ 188.81

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	32.0	X	1.080	=	.346	
<u>Oil and Gas</u>	2.1	X	2.452	=	.051	
<u>Wages</u>	36.1	X	1.074	=	.387	
<u>Transportation</u>	29.8	X	1.229	=	.366	Schedule 18 Cost
100.0% Weighted Index =					1.150	X \$ 188.81
					Schedule 19 Cost =	\$ 217.13
						\$ _____

III Misc. Add'l Costs/Adjustments

1/ G & A cost not allowed on cost of flag car.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - Logging Yarding & Loading - Western Oregon  
Operations - EQUIPMENT MOVE-IN (6) 110' PORTABLE TOWER YARDOR  
Reference for Cost Table ILLUSTRATION 2 - TABLE 1

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>TOWER/YARDOR - 110' TOWER</u> <u>4 HOUR DELAY</u>	<u>4x 11.59</u>		<u>46.36</u>
2. <u>LOADING TRUCK &amp; TRAILER FOR</u> <u>Hauling</u> <u>2 HOURS DELAY &amp; MACHINE TIME</u>	<u>4x 4.15</u>	<u>2x 5.53</u>	<u>27.66</u>
3. <u>FLAT LMC - COMMERCIAL RATE</u>			<u>56.30</u>
4.			
5.			
6.			
Total Machine Rate . . . . \$			<u>130.32</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1. <u>YARDING ENGINEER</u>	<u>4x 8.88</u>	<u>35.52</u>
2. <u>LOG TRUCK DRIVER</u>	<u>4x 6.62</u>	<u>26.48</u>
3.		

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 62.00

C. General and Administrative Costs  
10% of Machine and Wage Rates

1/ \$ 136.02 X 10% . . . . . \$ 13.60

D. Total Costs . . . . . \$ 205.92

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	37.7	X	1.080	=	.407	
<u>Oil and Gas</u>	1.9	X	2.452	=	.047	
<u>Wages</u>	33.1	X	1.074	=	.356	
<u>Transportation</u>	27.3	X	1.229	=	.335	Schedule 18 Cost
	100.0%		Weighted Index	=	1.145	X \$ 205.92
					Schedule 19 Cost	= \$ 235.78
						\$

III Misc. Add'l Costs/Adjustments

1/ G & A cost not allowed on cost of flag truck  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - Logging Grading & Loading - Western Oregon  
Operations - EQUIPMENT MOVE-IN - (7) STATIC SKYLINE <sup>TOWER</sup> GARAGE SIDE  
Reference for Cost Table ILLUSTRATION 2 TABLE 1

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>120' Tower/Garage / Sky car /</u> <u>SINGLE DRUM - 237000 lbs.</u> <u>9 HOUR BECM</u>	<u>9 x 41.28</u>		<u>371.52</u>
2. <u>Low Boy - FOR HAULING SKYLINE</u> <u>PUC RATE .390/CWT.</u> <u>237000 lbs X .390/CWT.</u>			<u>1042.28</u>
3. <u>Low Boy - Empty Mileage Charge</u> <u>PUC RATE - 4 CARRIERS</u> <u>125 MILES</u>			<u>192.80</u>
4. <u>FLAG CAR - COMMERCIAL RATE</u> <u>125 MILES</u>			<u>504.40</u>
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$ <u>2111.00</u>			

B. <u>Wage Rates (Adjusted Hourly Rate)</u> Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1. <u>GRADING ENGINEER</u>	<u>8 x 8.88</u>	<u>71.04</u>
2. <u>LOADING ENGINEER</u>	<u>8 x 9.32</u>	<u>74.56</u>
3. <u>TRACTOR OPERATOR</u>	<u>8 x 8.75</u>	<u>70.00</u>

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4.	<u>Laborer</u>	<u>6 x 6.82</u>	<u>40.92</u>
5.	<u></u>	<u></u>	<u></u>
6.	<u></u>	<u></u>	<u></u>
7.	<u></u>	<u></u>	<u></u>
8.	<u></u>	<u></u>	<u></u>

Total Wage Rate \$ 256.52

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 1,863.12 <sup>1/</sup> X 10% . . . . . \$ 186.31

D. Total Costs . . . . . \$ 2,553.83

II Updating Costs

	<u>Schedule 18</u> <u>Operating Cost</u> <u>in %</u>	<u>X</u>	<u>Increase</u> <u>Factor</u>	<u>=</u>	<u>Current</u> <u>Index</u>	
<u>Equipment</u>	<u>16.0</u>	<u>X</u>	<u>1.080</u>	<u>=</u>	<u>.173</u>	
<u>Oil and Gas</u>	<u></u>	<u>X</u>	<u></u>	<u>=</u>	<u></u>	
<u>Wages</u>	<u>11.0</u>	<u>X</u>	<u>1.074</u>	<u>=</u>	<u>.118</u>	
<u>Transportation</u>	<u>73.0</u>	<u>X</u>	<u>1.229</u>	<u>=</u>	<u>.897</u>	<u>Schedule 18</u> <u>Cost</u>
	<u>100.0%</u>	<u>Weighted Index</u>	<u>=</u>	<u>1.188</u>	<u>X</u>	<u>\$ 2,553.83</u>
				<u>Schedule 19 Cost</u>	<u>=</u>	<u>\$ 3,033.95</u>
						<u>\$</u>

III Misc. Add'l Costs/Adjustments

1/ G & A cost not allowed on cost of flag car.

Move-in Allowances for associated equipment

Yarding Tractor - D7F - 315/70 miles = 4.50/mile

Mobile Loader - TL98 - 635/70 miles = 9.07/mile

Basic road construction unit - 870/70 miles = 12.43/mile



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - Rigging Yarding & Loading - Western Oregon

Operations - Equipment Move-In (8) Mobile Yarden Loader

Reference for Cost Table ILLUSTRATION 2 TABLE 1

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>YARDER/LOADER - TRAX LOADER TL-6</u> <u>4 HOUR MACHINE TIME</u>	<u>4 x 9.46</u>	<u>4 x 6.25</u>	<u>62.84</u>
2. <u>FLAG CR. COMMERCIAL RATE</u>			<u>56.30</u>
3.			
4.			
5.			
6.			
Total Machine Rate . . . . \$			<u>119.14</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1. <u>YARDING ENGINEER -</u>	<u>4 x 8.88</u>	<u>35.52</u>
2.		
3.		

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 35.52

C. General and Administrative Costs  
10% of Machine and Wage Rates

$\frac{1}{\$ 98.36} \times 10\% \dots \dots \dots \$ 9.84$

D. Total Costs \dots \dots \dots \$ 164.50

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	39.0	X	1.080	=	.421	
<u>Oil and Gas</u>	3.0	X	2.452	=	.074	
<u>Wages</u>	23.8	X	1.074	=	.256	
<u>Transportation</u>	34.2	X	1.229	=	.420	Schedule 18 Cost
	100.0%	Weighted Index	=	1.171	X	\$ 164.50
				Schedule 19 Cost	=	\$ 192.63/hr
						\$ _____

III Misc. Add'l Costs/Adjustments

1/ G & A Cost not allowed on cost of flag car



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - Logging Operations & Loading - Western Oregon  
Operations - Equipment Move - In (9) Light Mobile Log Loader

Reference for Cost Table Illustration 2 TABLE 1

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>Loader - Rammer Model M</u> <u>Delay 2 Hours -</u>	<u>2x 2.35</u>		<u>4.70</u>
2. <u>Loader Carrier operating as log</u> <u>Truck for Hauling.</u> <u>2 Hour operating.</u>		<u>2x 5.53</u>	<u>11.06</u>
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$			<u>15.76</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate)		
Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1. <u>Logging Engineer</u>	<u>2x 9.32</u>	<u>18.64</u>
2. _____	_____	_____
3. _____	_____	_____

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 18.64

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 34.40 X 10% . . . . . \$ 3.44

D. Total Costs . . . . . \$ 37.84

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>35.5</u>	X	<u>1.080</u>	=	<u>.383</u>	
<u>Oil and Gas</u>	<u>10.3</u>	X	<u>2.452</u>	=	<u>.253</u>	
<u>Wages</u>	<u>54.2</u>	X	<u>1.074</u>	=	<u>.582</u>	
		X		=		Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.218</u>	X	\$ <u>37.84</u>
				Schedule 19 Cost	=	\$ <u>46.09</u>
						\$ _____

III Misc. Add'l Costs/Adjustments

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - PILING YARDING & LOADING - WESTERN OREGON

Operations - EQUIPMENT MOVE-IN (10) HEAVY MOBILE LOG LOADER

Reference for Cost Table ILLUSTRATION 2 TABLE 1

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>LINK BELT - TL-98</u> <u>4 HOUR MACHINE TIME</u> <u>76 000 lbs.</u>	<u>4x6.32</u>	<u>4x5.53</u>	<u>47.40</u>
2. <u>LOW BOY - FIVE HAULING LOADS</u> <u>PUC RATE .209/CWT</u> <u>76 000 lbs x .209/CWT -</u>			<u>167.20</u>
3. <u>LOW BOY - EMPTY MILEAGE CHARGE</u> <u>PUC RATE - 2 CENTS -</u> <u>60 MILES -</u>			<u>96.40</u>
4. <u>TRUCK - COMMERCIAL RATE</u> <u>2 TRIPS -</u> <u>70 MILES -</u>			<u>112.60</u>
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$			<u>423.60</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1. <u>LOADING ENGINEER</u>	<u>4x9.32</u>	<u>37.28</u>
2. <u>LABORER (Helper)</u>	<u>4x6.82</u>	<u>27.28</u>
3. _____	_____	_____

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
 5. \_\_\_\_\_  
 6. \_\_\_\_\_  
 7. \_\_\_\_\_  
 8. \_\_\_\_\_

Total Wage Rate                      \$    64.56

C. General and Administrative Costs  
 10% of Machine and Wage Rates

1/ \$ 375.56                      X 10%                      \$ 37.56

D. Total Costs                      \$ 525.72

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	8.8	X	1.080	=	.095	
<u>Oil and Gas</u>	1.1	X	2.452	=	.027	
<u>Wages</u>	13.5	X	1.074	=	.145	
<u>Transportation</u>	76.6	X	1.229	=	.941	Schedule 18 Cost
	100.0%		Weighted Index	=	1.208	X \$ 525.72
			Schedule 19 Cost	=	\$ 635.07	
					\$	_____

III Misc. Add'l Costs/Adjustments

1/ G & A cost not allowed on cost of flag car.

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\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



## 9333.3 - PRODUCTION COSTS

(Schedule 19)

## Operating Cost Computations

b. Activity - Logging Unloading & Loading - Western Oregon  
Operations - EQUIPMENT MOVE-IN (10A) Heavy Mobile  
LOG LOADER -

Reference for Cost Table ILLUSTRATION 2 TABLE 1

## I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> <u>Machine/Time</u>			
1. <u>LINK BELT HC-98</u> <u>(RUBBER TIRED) - 6 HOURS.</u> <u>MACHINE TIME</u>	<u>6 x 8.34</u>	<u>6 x 7.72</u>	<u>96.36</u>
2. <u>FLAG CAR - COMMERCIAL RATE</u> <u>SIX HOURS - @ 70 MILES -</u>			<u>75.70</u>
3. <u>ON HIGHWAY TRIP PERMIT.</u> <u>DNU</u>			<u>5.00</u>
4.			
5.			
6.			
Total Machine Rate . . .			\$ <u>177.06</u>

B. Wage Rates (Adjusted Hourly Rate)  
Crew Position/Time

	<u>Hour Rate</u>	<u>Total</u>
1. <u>LOADING ENGINEER</u>	<u>6 x 9.32</u>	<u>55.92</u>
2. <u>LABORER (HELPER)</u>	<u>6 x 6.82</u>	<u>40.92</u>
3.		

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
 5. \_\_\_\_\_  
 6. \_\_\_\_\_  
 7. \_\_\_\_\_  
 8. \_\_\_\_\_

Total Wage Rate                      \$     96.84

C. General and Administrative Costs  
 10% of Machine and Wage Rates

1/ \$     198.20     X 10% . . . . . \$     19.82

D. Total Costs . . . . . \$     293.72

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index		
<u>Equipment</u>	.332	X	1.080	=	.359		
<u>Oil and Gas</u>	.029	X	2.452	=	.071		
<u>Wages</u>	.364	X	1.074	=	.391		
<u>Transportation</u>	.275	X	1.229	=	.338	Schedule 18 Cost	
100.0% Weighted Index					=	1.159	X \$     293.72
					=	\$     340.42	
						\$	_____

III Misc. Add'l Costs/Adjustments

1/ G & A costs not allowed on cost of flag car

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9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - RIGGING YARDING & LOADING - WESTERN OREGON  
Operations - EQUIPMENT MOVE - IN (11) RUBBER TIERED FRONT END LOG LOADER  
Reference for Cost Table ILLUSTRATION 2 TABLE 1

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>FRONT END LOADER - CAT 966C</u> <u>3 HOUR MACHINE TIME</u>	3 X 3.63	3 X 5.49	27.36
2. <u>ON HIGHWAY TRIP PERMIT</u> <u>DMU</u>			5.00
3.			
4.			
5.			
6.			
Total Machine Rate . . . . .			\$ 32.36

	<u>Hour Rate</u>	<u>Total</u>
B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time		
1. <u>TRACTOR OPERATOR</u>	3 X 8.75	26.25
2.		
3.		

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 26.25

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 58.61 X 10% . . . . . \$ 5.86

D. Total Costs . . . . . \$ 64.47

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>45.4</u>	X	<u>1.080</u>	=	<u>.490</u>	
<u>Oil and Gas</u>	<u>09.8</u>	X	<u>2.452</u>	=	<u>.240</u>	
<u>Wages</u>	<u>44.8</u>	X	<u>1.074</u>	=	<u>.481</u>	
		X		=		Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.211</u>	X	\$ <u>64.47</u>
			Schedule 19 Cost	=	\$	<u>78.07</u>
					\$	_____

III Misc. Add'l Costs/Adjustments

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - RIGGING YARDING & LOADING - EASTERN OREGON  
(2) Operations - EQUIPMENT MOVE-IN (1) YARDING TRACTOR

Reference for Cost Table ILLUSTRATION 2 TABLE 2

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>TRACTOR - CATOCPILLAR D7F</u> <u>49000 lbs</u> <u>2 HOUR DELMY</u>	<u>2 x 6.24</u>		<u>12.48</u>
2. <u>LOWBOY FOR HAULING TRACTOR</u> <u>DUC RATE</u>			<u>74.10</u>
3. <u>LOWBOY - EMPTY MILEAGE CHARGE</u> <u>DUC RATE</u>			<u>19.20</u>
4. <u>FLAG TRUCK (CREW TRUCK)</u> <u>CARRY ALL</u> <u>2 HOUR MACHINE COST</u>	<u>2 x 42</u>	<u>2 x 78</u>	<u>2.40</u>
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$ <u>108.18</u>			

B. <u>Wage Rates (Adjusted Hourly Rate)</u> Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1. <u>TRACTOR OPERATOR</u>	<u>2 x 7.85</u>	<u>15.70</u>
2. _____	_____	_____
3. _____	_____	_____

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 15.70

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 123.98 X 10% . . . . . \$ 12.39

D. Total Costs . . . . . \$ 136.27

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>11.4</u>	X	<u>1.080</u>	=	<u>.123</u>	
<u>Oil and Gas</u>	<u>0.6</u>	X	<u>2.452</u>	=	<u>.015</u>	
<u>Wages</u>	<u>12.7</u>	X	<u>1.074</u>	=	<u>.136</u>	
<u>Transportation</u>	<u>75.3</u>	X	<u>1.229</u>	=	<u>.925</u>	Schedule 18 Cost
	100.0%		Weighted Index	=	<u>1.199</u>	X \$ <u>136.27</u>
					Schedule 19 Cost	= \$ <u>163.39</u>
						\$ _____

III Misc. Add'l Costs/Adjustments

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

Activity - Rigging Unloading & Loading - Eastern Oregon  
Operations - Equipment Move-In (2) Heavy Mobile Log Loader  
Reference for Cost Table ILLUSTRATION 2 TABLE 2

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>LINK BELT - TL-98</u> <u>76,000 lbs</u> <u>4 HOUR MACHINE TIME</u>	<u>4X6.32</u>	<u>4X5.53</u>	<u>47.40</u>
2. <u>LOWBOY - FOR HAULING LOGS</u> <u>PUC RATE</u> <u>2 CARRIERS</u>			<u>167.20</u>
3. <u>LOWBOY - EMPTY MILEAGE CHARGE</u> <u>PUC RATE</u> <u>2 CARRIERS -</u>			<u>96.40</u>
4. <u>FLAT TRUCK (CREW TRUCK)</u> <u>CARRY ALL</u> <u>4 HOUR MACHINE COST</u>	<u>4X.42</u>	<u>4X.78</u>	<u>4.80</u>
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$			<u>315.80</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1. <u>LOADING ENGINEER (Loading op.)</u>	<u>4X9.19</u>	<u>36.76</u>
2. <u>LABORER (HELPER)</u>	<u>4X6.75</u>	<u>27.00</u>
3. _____	_____	_____

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 63.76

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 379.56 X 10% . . . . . \$ 37.96

D. Total Costs . . . . . \$ 417.52

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	12.0	X	1.080	=	.130	
<u>Oil and Gas</u>	01.8	X	2.452	=	.044	
<u>Wages</u>	16.8	X	1.074	=	.180	
<u>Transportation</u>	69.4	X	1.229	=	.853	Schedule 18 Cost
	100.0%		Weighted Index	=	1.207	X \$ 417.52
						Schedule 19 Cost = \$ 503.94
						\$ _____

III Misc. Add'l Costs/Adjustments

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



9333.3 - PRODUCTION COSTS

(Schedule 19)

Operating Cost Computations

Activity - Rigging, Grading & Loading - Eastern Oregon

Operations - Equipment Move-In (3) Mobile Grader/Loader

Reference for Cost Table ILLUSTRATION 2 TABLE 2

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> <u>Machine/Time</u>			
1. <u>Grader/Loader Track Loader TL-6</u> <u>4 Hour Machine Time</u>	<u>4X9.46</u>	<u>4X6.25</u>	<u>62.84</u>
2. <u>Flag Truck (Crew Truck)</u> <u>Carry All</u> <u>4 Hour Machine Cost</u>	<u>4X.42</u>	<u>4X.78</u>	<u>4.80</u>
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____

Total Machine Rate . . . . \$ 67.64

B. <u>Wage Rates (Adjusted Hourly Rate)</u> <u>Crew Position/Time</u>	<u>Hour Rate</u>	<u>Total</u>
1. <u>Grading Engineer (Grader op)</u>	<u>4X9.19</u>	<u>36.76</u>
2. <u>Loader (Driver)</u>	<u>4X6.75</u>	<u>27.00</u>
3. _____	_____	_____

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 63.76

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 131.40 X 10% . . . . . \$ 13.14

D. Total Costs . . . . . \$ 144.54

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase, Factor	=	Current Index	
<u>Equipment</u>	<u>47.0</u>	X	<u>1.080</u>	=	<u>.508</u>	
<u>Oil and Gas</u>	<u>04.5</u>	X	<u>2.452</u>	=	<u>.110</u>	
<u>Wages</u>	<u>48.5</u>	X	<u>1.074</u>	=	<u>.521</u>	
		X		=		Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.139</u>	X	\$ <u>144.54</u>
						Schedule 19 Cost = \$ <u>164.63</u>
						\$ _____

III Misc. Add'l Costs/Adjustments

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - Pigging Yarding & Loading - Western Oregon

(3) Operations - TRACTOR LOGGING - YARDING

Reference for Cost Table ILLUSTRATION 2 - TABLES 3, 4, 6 & 7

I Determining Hourly Cost

		<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A.	<u>Machine Rates</u> Machine/Time			
1.	<u>2 YARDING TRACTORS - CAT D7F</u> <u>MACHINE OPERATING RATE</u>	<u>2 x 6.24</u>	<u>2 x 7.32</u>	<u>27.12</u>
2.	<u>CHAINSAW</u> <u>FIXED COST / HOUR plus</u> <u>3 HOURS PER DAY OPERATION -</u>	<u>.31</u>	<u>3/8 x .79</u>	<u>.61</u>
3.				
4.				
5.				
6.				

Total Machine Rate . . . . \$ 27.73

B.	<u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1.	<u>2- TRACTOR OPERATORS (LARGE)</u>	<u>2 x 8.75</u>	<u>17.50</u>
2.	<u>2- CHOKER SETTERS</u>	<u>2 x 7.39</u>	<u>14.78</u>
3.	<u>1- CHASER</u>	<u>7.67</u>	<u>7.67</u>

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 39.95

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 67.68 X 10% . . . . . \$ 6.77

D. Total Costs . . . . . \$ 74.45

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>35.9</u>	X	<u>1.080</u>	=	<u>.388</u>	
<u>Oil and Gas</u>	<u>5.1</u>	X	<u>.452</u>	=	<u>.125</u>	
<u>Wages</u>	<u>59.0</u>	X	<u>1.074</u>	=	<u>.634</u>	
		X		=		Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.147</u>	X	\$ <u>74.45</u>

Schedule 19 Cost = \$ 85.39 /hr.

Two tractors \$ 1.423/min.

One tractor \$ 0.712/min.

III Misc. Add'l Costs/Adjustments

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - Logging Yarding & Loading - Western Oregon

(4) Operations - TRACTOR LOGGING - Loading <sup>TL-98</sup> w/Mobile Loader TL 98

Reference for Cost Table ILLUSTRATION 2 - TABLES 3, 5, 6 & 8

I Determining Hourly Cost

		<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A.	<u>Machine Rates</u> Machine/Time			
* 1.	<u>MOBILE LOADER - LINK BELT TL-98</u> <u>FIXED COST / HOUR PLUS HOURLY</u> <u>OPERATING RATE AT 75%</u>	<u>6.32</u>	<u>.75 x 5.53</u>	<u>10.47</u>
2.				
3.				
4.				
5.				
6.				
Total Machine Rate . . . .		\$	<u>10.47</u>	

B. Wage Rates (Adjusted Hourly Rate)  
Crew Position/Time

	<u>Hour Rate</u>	<u>Total</u>
1. <u>LOADING ENGINEER</u>	<u>9.32</u>	<u>9.32</u>
2.		
3.		

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 9.32

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 19.79 X 10% . . . . . \$ 1.98

D. Total Costs . . . . . \$ 21.77

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>48.0</u>	X	<u>1.080</u>	=	<u>.518</u>	
<u>Oil and Gas</u>	<u>4.9</u>	X	<u>2.452</u>	=	<u>.120</u>	
<u>Wages</u>	<u>47.1</u>	X	<u>1.074</u>	=	<u>.506</u>	
_____		X		=		Schedule 18 Cost _____
	100.0%	Weighted Index	=	<u>1.144</u>	X	\$ <u>21.77</u>
						Schedule 19 Cost = \$ <u>24.90</u>
						\$ <u>0.415/min</u>

III Misc. Add'l Costs/Adjustments (Half loading cost for tractor loading \$ 0.208/min)

\* Reduction of 25% reflects waiting time for yarding tractors and machine down time.

(TL 98)



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - Rigging Yarding & Loading - Western Oregon

(5) Operations - Tractor Logging - Loading - HC 98

Reference for Cost Table \_\_\_\_\_

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. Heavy Mobile Loader Link Belt HC 98 Rubber Tired Operating Rate @ 75%	8.34	.75 x 7.72	14.13

Total Machine Rate 14.13

B. Wage Rates (Adjusted Hourly Rate)  
Crew Position/Time

	<u>Hour Rate</u>	<u>Total</u>
1. Loading Engineer	9.32	9.32

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
 5. \_\_\_\_\_  
 6. \_\_\_\_\_  
 7. \_\_\_\_\_  
 8. \_\_\_\_\_

Total Wage Rate                      \$ 9.32

C. General and Administrative Costs  
 10% of Machine and Wage Rates

\$ 23.45 X 10% . . . . . \$ 2.34

D. Total Costs . . . . . \$ 25.79

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index
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<u>Equipment</u>	<u>56.2</u>	X	<u>1.080</u>	=	<u>.607</u>
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<u>Oil and Gas</u>	<u>4.1</u>	X	<u>2.452</u>	=	<u>.100</u>
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<u>Wages</u>	<u>39.7</u>	X	<u>1.074</u>	=	<u>.426</u>
--------------	-------------	---	--------------	---	-------------

		X		=	Schedule 18 Cost
--	--	---	--	---	---------------------

100.0% Weighted Index = 1.133 X \$ 25.79/hr.

Schedule 19 Cost = \$ 29.22/hr.

\$ .487 /min.

III Misc. Add'l Costs/Adjustments (Half loading cost for tractor yarding) \$ .244 /min.

\*Reduction of 25% reflects waiting time for yarding tractors and machine down time. (HC 98)



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - Logging Yarding & Loading - Western Oregon  
(6) Operations - TRACTOR LOGGING - SALVAGE PICKUP - YARDING

Reference for Cost Table ILLUSTRATION 2 TABLES 7A & 8A

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>1 YARDING TRACTOR</u> <u>CAT D7F</u> <u>MACHINE RATE</u>	<u>6.24</u>	<u>7.32</u>	<u>13.56</u>
2. <u>CHAINSAW</u> <u>FLYED COST / HOUR Plus 3</u> <u>HOURS Per Day OF OPERATION</u>	<u>.31</u>	<u>3/8 x .79</u>	<u>.61</u>
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$			<u>14.17</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1. <u>TRACTOR OPERATOR</u>	<u>8.75</u>	<u>8.75</u>
2. <u>CHOKER SETTER</u>	<u>7.39</u>	<u>7.39</u>
3. _____	_____	_____

(C-2. b 6)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4.			
5.			
6.			
7.			
8.			

Total Wage Rate \$ 16.14C. General and Administrative Costs  
10% of Machine and Wage Rates\$ 30.31 X 10% . . . . . \$ 3.03D. Total Costs . . . . . \$ 33.34II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>40.9</u>	X	<u>1.080</u>	=	<u>.442</u>	
<u>Oil and Gas</u>	<u>05.8</u>	X	<u>2.452</u>	=	<u>.142</u>	
<u>Wages</u>	<u>53.3</u>	X	<u>1.074</u>	=	<u>.572</u>	
		X		=		Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.156</u>	X	\$ <u>33.34</u>
				Schedule 19 Cost	=	\$ <u>38.54/pr.</u>
						\$ <u>0.643/min</u>

III Misc. Add'l Costs/AdjustmentsTabular AdjustmentSalvage Pickup Yarding Cost (one tractor)/min.Tractor Logging Yarding Cost (one tractor)/min.Adj: \$0.643/.712 = .903 Factor for Salvage Pickup



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - Logging Yarding & Loading - Western Oregon

(7) Operations - Tractor Logging - Salvage Pickup - Loading

Reference for Cost Table ILLUSTRATION 2 - TABLES 7A & 8A

I Determining Hourly Cost

		<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time				
* 1.	<u>FRONT END LOG LOADER. CAT 966C</u> <u>FIXED COST / HOUR Plus</u> <u>Hourly operating rate of 75%</u>	<u>3.63</u>	<u>75 x 549</u>	<u>7.75</u>
2.	_____	_____	_____	_____
3.	_____	_____	_____	_____
4.	_____	_____	_____	_____
5.	_____	_____	_____	_____
6.	_____	_____	_____	_____
Total Machine Rate . . . . .		\$ <u>7.75</u>		

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time		<u>Hour Rate</u>	<u>Total</u>
1.	<u>FRONT END LOADER OPERATOR</u> <u>(TRACTOR OPERATOR - LARGE)</u>	<u>8.75</u>	<u>8.75</u>
2.	_____	_____	_____
3.	_____	_____	_____

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4.			
5.			
6.			
7.			
8.			

Total Wage Rate \$ 8.75

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 16.50 X 10% . . . . . \$ 1.65

D. Total Costs . . . . . \$ 18.15

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	39.7	X	1.08	=	.429	
<u>Oil and Gas</u>	7.3	X	2.452	=	.179	
<u>Wages</u>	53.0	X	1.074	=	.569	
		X		=		Schedule 18 Cost
	100.0%	Weighted Index	1.177	X	\$ 18.15	
					Schedule 19 Cost =	\$ 21.36/hr.
						\$ 0.355/min

III Misc. Add'l Costs/Adjustments

\* Reduction of 25% reflects waiting time for yarding tractor and machine  
down time. Tabulation adjustment - Salvage Pickup Logging Cost = .355  
Tractor Logging Loading Cost = .415  
Adjustment .355/.415 = .855 factor for salvage pickup



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - Logging, Yarding & Loading - Western Oregon  
(8) Operations - TRACTOR LOGGING - FIGHTING COST - Clearcut & Partial Cut  
Reference for Cost Table ILLUSTRATION 2 TABLE 9 (1<sup>st</sup> Landing)

I Determining Hourly Cost

		<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A.	<u>Machine Rates</u> Machine/Time			
1.	<u>2 YARDING TRACTORS - CAT D7F</u> <u>2 1/2 HOURS FUEL COSTS</u>	<u>5 x 6.24</u>		<u>31.20</u>
2.	<u>CHAIN SAW</u> <u>4 HOURS FUEL COSTS</u>	<u>4 x 3.1</u>		<u>1.24</u>
3.	<u>MOBILE LOADER TL-98</u> <u>1 HOUR MACHINE COST</u>	<u>6.32</u>	<u>5.53</u>	<u>11.85</u>
4.	<u>YARDING TRACTOR - CAT D7F</u> <u>1 HOUR MACHINE COST FOR</u> <u>LANDING CONSTRUCTION</u>	<u>6.24</u>	<u>7.32</u>	<u>13.56</u>
5.				
6.				
Total Machine Rate . . . . \$			<u>57.85</u>	

B.	<u>Wage Rates (Adjusted Hourly Rate)</u> Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1.	<u>2 TRACTOR OPERATORS (3 hours)</u>	<u>6 x 8.75</u>	<u>52.50</u>
2.	<u>2 CHOKER SETTERS (4 hours)</u>	<u>8 x 7.39</u>	<u>59.12</u>
3.	<u>CHASER (1 hour)</u>	<u>7.67</u>	<u>7.67</u>

(C-2. b 8)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4.	<u>Logging Engineer (1 hour)</u>	<u>9.32</u>	<u>9.32</u>
5.	<u></u>	<u></u>	<u></u>
6.	<u></u>	<u></u>	<u></u>
7.	<u></u>	<u></u>	<u></u>
8.	<u></u>	<u></u>	<u></u>
Total Wage Rate		\$ <u>128.61</u>	

C. General and Administrative Costs  
10% of Machine and Wage Rates\$ 186.46 X 10% . . . . . \$ 18.64D. Total Costs . . . . . \$ 205.10II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>29.5</u>	X	<u>1.080</u>	=	<u>.319</u>	
<u>Oil and Gas</u>	<u>1.6</u>	X	<u>2.452</u>	=	<u>.039</u>	
<u>Wages</u>	<u>68.9</u>	X	<u>1.074</u>	=	<u>.740</u>	
		X		=		Schedule 18 Cost
100.0% Weighted Index		=	<u>1.098</u>	X	\$ <u>205.10</u>	
Schedule 19 Cost					=	\$ <u>225.00</u>
						\$ <u></u>

III Misc. Add'l Costs/Adjustments


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9333.3 - PRODUCTION COSTS

(Schedule 19)

Operating Cost Computations

b. Activity - Logging Yarding & Loading - Western Oregon

Operations - TRACTOR LOGGING - <sup>Logging</sup> COST Clear & Part Cut - Prod Loading

Reference for Cost Table ILLUSTRATION 2, TABLE 9

I Determining Hourly Cost

		<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A.	<u>Machine Rates</u> Machine/Time			
1.	<u>2 Yarding Tractors - CAT D7F</u> <u>1/2 Hour Fixed Cost</u> <u>1/2 Hour Machine Cost</u>	<u>6.24</u>	<u>7.32</u>	<u>13.56</u>
2.	<u>Caterpillar</u> <u>1/2 Hour Fixed Cost</u>	<u>.5 x 31</u>		<u>.15</u>
3.	<u>Mobile Loader - TL-98</u> <u>1/2 Hour Fixed Cost</u> <u>1/2 Hour Operating Cost</u>	<u>.5 x 6.32</u>	<u>5.53</u>	<u>5.93</u>
4.	<u>Yarding Tractor - CAT D7F</u> <u>1 Hour Machine Cost For</u> <u>Loading Construction</u>	<u>6.24</u>	<u>7.32</u>	<u>13.56</u>
5.				
6.				
Total Machine Rate . . . . .		\$	<u>33.20</u>	

B.	<u>Wage Rates (Adjusted Hourly Rate)</u> Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1.	<u>2 Tractor Operators (1/2 Hour)</u>	<u>8.75</u>	<u>8.75</u>
2.	<u>2 Coker Setters (1/2 Hour)</u>	<u>7.39</u>	<u>7.39</u>
3.	<u>Caterpillar (1/2 Hour)</u>	<u>.5 x 7.67</u>	<u>3.84</u>

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4.	<u>Loading Engineer</u>	<u>(1/2 hour)</u>	<u>5 x 9.32</u>	<u>4.66</u>
5.	<u></u>	<u></u>	<u></u>	<u></u>
6.	<u></u>	<u></u>	<u></u>	<u></u>
7.	<u></u>	<u></u>	<u></u>	<u></u>
8.	<u></u>	<u></u>	<u></u>	<u></u>

Total Wage Rate	\$ 24.64
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C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 57.84      X 10% . . . . . \$ 5.78

D. Total Costs . . . . .	\$ 63.62
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## II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase. Factor	=	Current Index	
<u>Equipment</u>	<u>50.5</u>	X	<u>1.080</u>	=	<u>.545</u>	
<u>Oil and Gas</u>	<u>6.9</u>	X	<u>2.452</u>	=	<u>.169</u>	
<u>Wages</u>	<u>42.6</u>	X	<u>1.074</u>	=	<u>.458</u>	
<u>                    </u>		X		=		Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.172</u>	X \$	<u>63.62</u>
			Schedule 19 Cost	=	\$	<u>74.56</u>
					\$	<u>          </u>

### III Misc. Add'l Costs/Adjustments

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9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - Logging, Grading & Logging - Western Oregon

(9) Operations - Tractor Logging - Logging Cost Salvage Pickup

Reference for Cost Table Illustration 2 TABLE 9

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> <u>Machine/Time</u>			
1. <u>Grading Tractor - CAT D7F</u> <u>2 1/2 HOURS FUEL COSTS</u>	<u>2.5 x 6.24</u>		<u>15.60</u>
2. <u>CHAINSAW</u> <u>4 HOURS FUEL COSTS</u>	<u>4 x .31</u>		<u>1.24</u>
3. <u>FRONT END LOADER - CAT 966C</u> <u>1 HOUR MACHINE RATE</u>	<u>3.63</u>	<u>5.49</u>	<u>9.12</u>
4. <u>Grading Tractor - CAT D7F</u> <u>1 HOUR MACHINE RATE FOR</u> <u>Grading Construction</u>	<u>6.24</u>	<u>7.32</u>	<u>13.56</u>
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$			<u>39.52</u>

B. Wage Rates (Adjusted Hourly Rate)  
Crew Position/Time

	<u>Hour Rate</u>	<u>Total</u>
1. <u>Tractor Operator (6 Hours)</u>	<u>6 x 8.75</u>	<u>52.50</u>
2. <u>Choker Setter (6 Hours)</u>	<u>6 x 7.39</u>	<u>44.34</u>
3. <u>FRONT END LOADER OPR (3 Hours)</u>	<u>3 x 8.75</u>	<u>26.25</u>

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 123.09

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 162.61 X 10% . . . . . \$ 16.26

D. Total Costs . . . . . \$ 178.87

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>22.3</u>	X	<u>1.080</u>	=	<u>.241</u>	
<u>Oil and Gas</u>	<u>2.0</u>	X	<u>2.452</u>	=	<u>.049</u>	
<u>Wages</u>	<u>75.7</u>	X	<u>1.074</u>	=	<u>.813</u>	
_____	_____	X	_____	=	_____	Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.103</u>	X	\$ <u>178.87</u>
						Schedule 19 Cost = \$ <u>197.29</u>
						\$ _____

III Misc. Add'l Costs/Adjustments

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9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - RIGGING, YARDING & LOADING - WESTERN OREGON.  
Operations - TRACTOR LOGGING - RIGGING COST - SAWLOG PICKUP - AND L. LANDING.  
Reference for Cost Table ILLUSTRATION 2 TABLE 9

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>YARDING TRACTOR - CAT 07F</u> <u>2 HOURS FIXED COSTS</u> <u>2 HOURS OPERATING COSTS</u>	<u>2 x 6.24</u>	<u>2 x 7.32</u>	<u>27.12</u>
2. <u>CAT SAW</u> <u>1/2 HOUR FIXED COST</u>	<u>.5 x 31</u>		<u>.15</u>
3. <u>FRONT END LOG LOADER CAT 966C</u> <u>1/2 HOUR MACHINE COST</u>	<u>.5 x 363</u>	<u>.5 x 5.49</u>	<u>4.56</u>
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$			<u>31.83</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1. <u>TRACTOR OPERATOR (1 HOUR)</u>	<u>8.75</u>	<u>8.75</u>
2. <u>CAT SKIDDER (1 HOUR)</u>	<u>7.39</u>	<u>7.39</u>
3. <u>FRONT END LOADER OPERATOR (1 HOUR)</u>	<u>8.75</u>	<u>8.75</u>

(C-2. b-1)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
 5. \_\_\_\_\_  
 6. \_\_\_\_\_  
 7. \_\_\_\_\_  
 8. \_\_\_\_\_

Total Wage Rate \$ 24.89

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 56.72 X 10% . . . . . \$ 5.67

D. Total Costs . . . . . \$ 62.39

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>48.7</u>	X	<u>1.080</u>	=	<u>.526</u>	
<u>Oil and Gas</u>	<u>7.4</u>	X	<u>2.452</u>	=	<u>.181</u>	
<u>Wages</u>	<u>43.9</u>	X	<u>1.074</u>	=	<u>.471</u>	
		X		=		Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.178</u>	X	\$ <u>62.39</u>
						Schedule 19 Cost = \$ <u>73.49</u>
						\$ _____

III Misc. Add'l Costs/Adjustments

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 \_\_\_\_\_  
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9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - RIGGING YARDING & LOADING - EASTERN OREGON

(10) Operations - TRACTOR LOGGING - YARDING

Reference for Cost Table ILLUSTRATION 2 - TABLES - 10 & 11

I Determining Hourly Cost

		<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A.	<u>Machine Rates</u> Machine/Time			
1.	<u>2 YARDING TRACTOR DTF</u> <u>MACHINE RATE</u>	<u>2 x 6.24</u>	<u>7.32</u>	<u>27.12</u>
2.	<u>CATSKIN SAW</u> <u>FIXED COST PER HOUR - plus</u> <u>OPERATING BUILT ON 31 HOURS/DAY</u>	<u>.31</u>	<u>3/84 .79</u>	<u>.61</u>
3.				
4.				
5.				
6.				
Total Machine Rate . . . . .		\$	<u>27.73</u>	

B.	<u>Wage Rates (Adjusted Hourly Rate)</u> Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1.	<u>2 TRACTOR OPERATORS</u>	<u>2 x 7.85</u>	<u>15.70</u>
2.	<u>2 CHAIN SAW SETTERS</u>	<u>2 x 6.98</u>	<u>13.96</u>
3.	<u>KNOT BUMPER</u>	<u>6.93</u>	<u>6.93</u>

(C-2. b-10)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4.	_____	_____	_____
5.	_____	_____	_____
6.	_____	_____	_____
7.	_____	_____	_____
8.	_____	_____	_____

Total Wage Rate \$ 36.59C. General and Administrative Costs  
10% of Machine and Wage Rates\$ 64.32 X 10% . . . . . \$ 6.43D. Total Costs . . . . . \$ 70.75II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>37.7</u>	X	<u>1.080</u>	=	<u>.407</u>	
<u>Oil and Gas</u>	<u>5.4</u>	X	<u>2.452</u>	=	<u>.132</u>	
<u>Wages</u>	<u>56.9</u>	X	<u>1.074</u>	=	<u>.611</u>	
_____	_____	X	_____	=	_____	Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.150</u>	X	\$ <u>70.75</u>
				Schedule 19 Cost	=	\$ <u>81.36</u>
						\$ <u>1.356/min.</u>
				2 tractors		
				1 tractor		0.677/min.

III Misc. Add'l Costs/Adjustments

_____
_____
_____
_____



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - RIGGING, UNLOADING & LOADING - EASTERN OREGON

(11) Operations - TRACTOR LOGGING - LOADING

Reference for Cost Table ILLUSTRATION 2 - TABLES 10 & 12

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>MOBILE LOADER - LINK BELT T298</u> <u>MACHINE RATE</u>	<u>6.32</u>	<u>5.53</u>	<u>11.85</u>
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$			<u>11.85</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1. <u>Loader Operator</u>	<u>9.19</u>	<u>9.19</u>
2. <u>TOP LOADER</u>	<u>7.94</u>	<u>7.94</u>
3. _____	_____	_____

(C-2, p-11)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4.	_____	_____	_____
5.	_____	_____	_____
6.	_____	_____	_____
7.	_____	_____	_____
8.	_____	_____	_____

Total Wage Rate \$ 17.13C. General and Administrative Costs  
10% of Machine and Wage Rates\$ 28.98 X 10% . . . . . \$ 2.90D. Total Costs . . . . . \$ 31.88II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>36.4</u>	X	<u>1.080</u>	=	<u>.393</u>	
<u>Oil and Gas</u>	<u>4.5</u>	X	<u>2.452</u>	=	<u>.110</u>	
<u>Wages</u>	<u>59.1</u>	X	<u>1.074</u>	=	<u>.635</u>	
		X		=		Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.138</u>	X	\$ <u>31.88</u>
						Schedule 19 Cost = \$ <u>36.27/hr.</u>
						\$ <u>.604/min.</u>
						Half Loading
						cost for
						tractor .
						yarding.

III Misc. Add'l Costs/Adjustments



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - Logging Yarding & Loading - Eastern Oregon  
(12) Operations - TRACTOR LOGGING - RIGGING COST - FIRST LANDING

Reference for Cost Table ILLUSTRATION 2 - TABLE 13

I Determining Hourly Cost

		<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A.	<u>Machine Rates</u> Machine/Time			
1.	<u>2 YARDING TRACTORS - CAT D7F</u> <u>2 3/4 HOURS FIXED COST</u>	<u>5.5 x 6.24</u>		<u>34.32</u>
2.	<u>CATERPILLAR SAW</u> <u>4 HOURS FIXED COSTS</u>	<u>4 x .31</u>		<u>1.24</u>
3.	<u>MOBILE HOMER - LINK BELT TL-98</u> <u>1 HOUR FIXED COST</u> <u>1 HOUR OPERATING COST</u>	<u>6.32</u>	<u>5.53</u>	<u>11.85</u>
4.	<u>YARDING TRACTOR - CAT D7F</u> <u>1/2 HOUR MACHINE RATE FOR</u> <u>LANDING CONSTRUCTION.</u>	<u>.5 x 6.24</u>	<u>.5 x 7.32</u>	<u>6.78</u>
5.				
6.				

Total Machine Rate . . . . \$ 54.19

B.	<u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1.	<u>2 TRACTOR OPERATORS (3 HOURS)</u>	<u>6 x 7.85</u>	<u>47.10</u>
2.	<u>2 CATERPILLAR SETTERS (4 HOURS)</u>	<u>8 x 6.98</u>	<u>55.84</u>
3.	<u>KNOT DAMPER (1 HOUR)</u>	<u>6.93</u>	<u>6.93</u>

(C-2. p-12)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. <u>Loader Operator (1 hr.)</u>	<u>9.19</u>	<u>9.19</u>
5. <u>Top Loader (4 hrs.)</u>	<u>4 x 7.94</u>	<u>31.76</u>
6. _____	_____	_____
7. _____	_____	_____
8. _____	_____	_____

Total Wage Rate                      \$ 150.82

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 205.01 X 10% . . . . . \$ 20.50

D. Total Costs . . . . . \$ 225.51

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>25.4</u>	X	<u>1.080</u>	=	<u>.274</u>	
<u>Oil and Gas</u>	<u>1.0</u>	X	<u>2.452</u>	=	<u>.025</u>	
<u>Wages</u>	<u>73.6</u>	X	<u>1.074</u>	=	<u>.790</u>	
_____	_____	X	_____	=	_____	Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.089</u>	X	\$ <u>225.51</u>
				Schedule 19 Cost	=	\$ <u>245.58</u>
						\$ _____

III Misc. Add'l Costs/Adjustments

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9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - Logging YARDING & LOADING - EASTERN OREGON  
Operations - TRACTOR LOGGING - Logging Cost- ADDITIONAL LOADINGS  
Reference for Cost Table ILLUSTRATION 2 - TABLE 13

I Determining Hourly Cost

		<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A.	<u>Machine Rates</u> Machine/Time			
1.	<u>2 YARDING TRACTORS CAT D7F</u> <u>1/2 Hour Fixed Costs</u>	<u>6.24</u>		<u>6.24</u>
2.	<u>CATERPILLAR</u> <u>1/2 Hour Fixed Costs</u>	<u>.5 x .31</u>		<u>.15</u>
3.	<u>MOBILE LOADER - LINK BELT TL-98</u> <u>1/2 Hour Fixed Costs</u>	<u>.5 x 6.32</u>	<u>.5 x 5.53</u>	<u>5.92</u>
4.	<u>YARDING TRACTOR - CAT D7F</u> <u>1/2 Hour MACHINE RATE FOR</u> <u>LOADING CONSTRUCTION</u>	<u>.5 x 6.24</u>	<u>.5 x 7.32</u>	<u>6.78</u>
5.				
6.				
Total Machine Rate . . . .		\$	<u>19.09</u>	

B.	<u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1.	<u>2 TRACTOR OPERATORS (1/2 hour)</u>	<u>7.85</u>	<u>7.85</u>
2.	<u>2 CHOKER SETTERS (1/2 Hour)</u>	<u>6.98</u>	<u>6.98</u>
3.	<u>KNOT BUMPER (1/2 Hour)</u>	<u>.5 x 6.93</u>	<u>6.43</u>

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4.	Loader Operator (1/2 hr.)	.5 x 9.19	4.54
5.	Top Loader (1/2 hr.)	.5 x 7.94	3.97
6.			
7.			
8.			
Total Wage Rate		\$ 30.32	

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 49.41 X 10% . . . . . \$ 4.94

D. Total Costs . . . . .	\$ 54.35
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## II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase. Factor	=	Current Index	
<u>Equipment</u>	<u>35.6</u>	X	<u>1.080</u>	=	<u>.384</u>	
<u>Oil and Gas</u>	<u>3.0</u>	X	<u>2.452</u>	=	<u>.074</u>	
<u>Wages</u>	<u>61.4</u>	X	<u>1.074</u>	=	<u>.659</u>	
<u>                    </u>	<u>                    </u>	X	<u>                    </u>	=	<u>                    </u>	Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.117</u>	X	\$ <u>54.35</u>
			Schedule 19 Cost	=	\$	<u>60.70</u>
					\$	<u>                    </u>

### III Misc. Add'l Costs/Adjustments



9333.3 - PRODUCTION COSTS

(Schedule 19)

Operating Cost Computations

b. Activity - RIGGING, YARDING & LOADING - WESTERN OREGON

(13) Operations - HIGHLAND LOGGING - YARDING - MEDIUM YARDER

Reference for Cost Table ILLUSTRATION 2 - TABLES 14 & 15

I Determining Hourly Cost

		<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A.	<u>Machine Rates</u> Machine/Time			
1.	<u>MEDIUM YARDER - SKAGET BU 80C</u> <u>W/ RIGGED TREE</u> <u>MACHINE RATE</u>	<u>3.52</u>	<u>8.14</u>	<u>11.66</u>
2.	<u>CUTTING SAW</u> <u>FIXED COST PER HOUR PLUS</u> <u>HOURLY RATE OF 3 HOURS PER DAY</u>	<u>.31</u>	<u>3/8 8.79</u>	<u>.61</u>
3.				
4.				
5.				
6.				
Total Machine Rate . . . .		\$	<u>12.27</u>	

B.	<u>Wage Rates (Adjusted Hourly Rate)</u> Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1.	<u>HOOK TENDER</u>	<u>9.65</u>	<u>9.65</u>
2.	<u>RIGGING SKINGER</u>	<u>8.28</u>	<u>8.28</u>
3.	<u>2 CHOKER SETTERS</u>	<u>2X 7.39</u>	<u>14.78</u>

(C-2. p 13)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. <u>Chaser</u>	<u>7.67</u>	<u>7.67</u>
5. <u>Yarding Engineer</u>	<u>8.88</u>	<u>8.88</u>
6. _____	_____	_____
7. _____	_____	_____
8. _____	_____	_____

Total Wage Rate                      \$ 49.26

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 61.53 X 10% . . . . . \$ 6.15

D. Total Costs . . . . . \$ 67.68

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>15.8</u>	X	<u>1.080</u>	=	<u>.171</u>	
<u>Oil and Gas</u>	<u>4.1</u>	X	<u>2.452</u>	=	<u>.101</u>	
<u>Wages</u>	<u>80.1</u>	X	<u>1.074</u>	=	<u>.860</u>	
_____	_____	X	_____	=	_____	Schedule 18 Cost
100.0% Weighted Index = <u>1.132</u> X \$ <u>67.68</u>						
Schedule 19 Cost = \$ <u>76.61/hr.</u>						
\$ <u>.277/min.</u>						

III Misc. Add'l Costs/Adjustments

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9333.3 - PRODUCTION COSTS

(Schedule 19)

Operating Cost Computations

b. Activity - RIGGING YARDING & LOADING - WESTERN OREGON

(14) Operations - HIGHLAND LOGGING - YARDING - 65' TOWER

Reference for Cost Table ILLUSTRATION 2 - TABLES 18 & 19

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> <u>Machine/Time</u>			
1. <u>65' PORTABLE TOWER &amp; BEAM YARDER</u> <u>MACHINE RATE / HOUR</u>	<u>7.70</u>	<u>9.92</u>	<u>17.62</u>
2. <u>CATSAW</u> <u>TYED COST PER HOUR - OPERATING</u> <u>TIME AT 3 HOURS PER DAY</u>	<u>.31</u>	<u>3/8 X .79</u>	<u>.61</u>
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____

Total Machine Rate . . . . \$ 18.23

B. <u>Wage Rates</u> (Adjusted Hourly Rate) <u>Crew Position/Time</u>	<u>Hour Rate</u>	<u>Total</u>
1. <u>HOOK TENDER</u>	<u>9.65</u>	<u>9.65</u>
2. <u>RIGGING SLINGER</u>	<u>8.28</u>	<u>8.28</u>
3. <u>2 CHOKER SETTERS</u>	<u>2X 7.39</u>	<u>14.78</u>

(C-2. b (4))

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. <u>Chaser</u>	<u>7.67</u>	<u>7.67</u>
5. <u>Yarding Engineer</u>	<u>8.88</u>	<u>8.88</u>
6. _____	_____	_____
7. _____	_____	_____
8. _____	_____	_____
Total Wage Rate	\$ <u>49.26</u>	

C. General and Administrative Costs  
10% of Machine and Wage Rates\$ 67.49 X 10% . . . . . \$ 6.75D. Total Costs . . . . . \$ 74.24II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>24.3</u>	X	<u>1.080</u>	=	<u>.262</u>	
<u>Oil and Gas</u>	<u>2.7</u>	X	<u>2.452</u>	=	<u>.066</u>	
<u>Wages</u>	<u>73.0</u>	X	<u>1.074</u>	=	<u>.784</u>	
_____	_____	X	_____	=	_____	Schedule 18 Cost
100.0%	Weighted Index	=	<u>1.112</u>	X	\$ <u>74.24</u>	
			Schedule 19 Cost	=	\$ <u>82.55/hr.</u>	
					\$ <u>.376/min.</u>	

III Misc. Add'l Costs/Adjustments



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - RIGGING YARDING & LOADING - WESTERN OREGON  
(15) Operations - HIGHLEND LOGGING - YARDING - 110' TOWER

Reference for Cost Table ILLUSTRATION 2 TABLES 20 & 21

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>110' PORTABLE TOWER &amp; BARGE YARDER</u> <u>MACHINE RATE</u>	<u>11.59</u>	<u>13.38</u>	<u>24.97</u>
2. <u>CHAIN SAW</u> <u>FIXED COST PER HOUR - HOURLY</u> <u>OPERATION BASED ON 3 HOURS</u>	<u>.31</u>	<u>3/88.79</u>	<u>61</u>
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$			<u>25.58</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1. <u>HOOK TENDER</u>	<u>9.65</u>	<u>9.65</u>
2. <u>RIGGING SLINGER</u>	<u>8.28</u>	<u>8.28</u>
3. <u>2 CHOKER SETTERS</u>	<u>2X 7.39</u>	<u>14.78</u>

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. <u>Chaser</u>	<u>7.67</u>	<u>7.67</u>
5. <u>Yarding Engineer</u>	<u>8.88</u>	<u>8.88</u>
6. _____	_____	_____
7. _____	_____	_____
8. _____	_____	_____

Total Wage Rate \$ 49.26

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 74.84 X 10% . . . . . \$ 7.48

D. Total Costs . . . . . \$ 82.32

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>31.6</u>	X	<u>1.080</u>	=	<u>.341</u>	
<u>Oil and Gas</u>	<u>2.6</u>	X	<u>2.452</u>	=	<u>.064</u>	
<u>Wages</u>	<u>65.8</u>	X	<u>1.074</u>	=	<u>.707</u>	
_____	_____	X	_____	=	_____	Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.112</u>	X	\$ <u>82.32</u>
				Schedule 19 Cost	=	\$ <u>91.54/hr.</u>
						\$ <u>.526/min.</u>

III Misc. Add'l Costs/Adjustments

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9333.3 - PRODUCTION COSTS

(Schedule 19)

Operating Cost Computations

b. Activity - Logging, Grading & Loading - Western Oregon

(16) Operations - HIGHWAY LOGGING - Loading

Reference for Cost Table ILLUSTRATION 2 - TABLES 14, 16, 18, 20 & 22

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>MOBILE LOADER LINK BELT TL-98</u>	6.32	.75 x 5.53	10.47
* <u>FIXED COST/HOUR PASS HOURLY</u>			
<u>OPERATING RATE AT 75%</u>			
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$			<u>10.47</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1. <u>LOADING ENGINEER</u>	9.32	9.32
2. _____	_____	_____
3. _____	_____	_____

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4.	_____	_____	_____
5.	_____	_____	_____
6.	_____	_____	_____
7.	_____	_____	_____
8.	_____	_____	_____

Total Wage Rate \$ 9.32

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 19.79 X 10% . . . . . \$ 1.98

D. Total Costs . . . . . \$ 21.77

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>48.0</u>	X	<u>1.080</u>	=	<u>.518</u>	
<u>Oil and Gas</u>	<u>4.9</u>	X	<u>2.452</u>	=	<u>.120</u>	
<u>Wages</u>	<u>47.1</u>	X	<u>1.074</u>	=	<u>.506</u>	
		X		=		Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.144</u>	X	\$ <u>21.77</u>
						Schedule 19 Cost = \$ <u>24.90 /hr.</u>
						\$ <u>.415/min.</u>

III Misc. Add'l Costs/Adjustments

\* Reduction of 25% reflects waiting time for yarder and machine down time.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - REGGING, GRADING & LOADING - WESTERN OREGON  
(17) Operations - HILLAND LOGGING - RIGGING COST - MEDIUM GRADER - 1<sup>st</sup> TIME

Reference for Cost Table ILLUSTRATION 2 - TABLE 17

I Determining Hourly Cost

		<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A.	<u>Machine Rates</u> Machine/Time			
1.	<u>MEDIUM GRADER - SKAGIT BU 80C</u> <u>12 HOURS FIXED COST</u> <u>8 HOURS OPERATING COST</u>	<u>12 x 3.52</u>	<u>8 x 8.14</u>	<u>107.36</u>
2.	<u>CHAINSAW</u> <u>16 HOURS FIXED COST</u>	<u>16 x .31</u>		<u>4.96</u>
3.	<u>MOBILE LOADER - TL-98</u> <u>13 HOURS FIXED</u> <u>2 HOURS OPERATING</u>	<u>13 x 6.32</u>	<u>2 x 5.53</u>	<u>93.22</u>
4.	<u>TRACTOR DOZER D7F</u> <u>- LOADING CONSTRUCTION -</u> <u>8 HOURS MACHINE COST</u>	<u>8 x 6.24</u>	<u>8 x 7.32</u>	<u>108.48</u>
5.				
6.				
Total Machine Rate . . . .		\$	<u>314.02</u>	

B.	<u>Wage Rates (Adjusted Hourly Rate)</u> Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1.	<u>GRADING ENGINEER (12 Hours)</u>	<u>12 x 8.88</u>	<u>106.56</u>
2.	<u>RIGGING SLINGER (16 Hours)</u>	<u>16 x 8.28</u>	<u>132.48</u>
3.	<u>2 CHOKER SETTERS - (16 Hours)</u>	<u>32 x 7.39</u>	<u>236.48</u>

(C-2. b (7))

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4.	Chaser	(21 hrs.)	21 x 7.67	161.07
5.	Hook Tender	(16 hrs.)	16 x 9.65	154.40
6.	Loading Engineer	(13 hrs.)	13 x 9.32	121.16
* 7.	Chaser	( 8 hrs.)	8 x 7.67	61.36
* 8.	Tractor Operator	( 8 hrs.)	8 x 8.75	70.00
Total Wage Rate			\$ 1,043.51	

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 1,357.53 X 10% . . . . . \$ 135.75

D. Total Costs . . . . . \$ 1,493.28II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>20.4</u>	X	<u>1.080</u>	=	<u>.220</u>	
<u>Oil and Gas</u>	<u>2.7</u>	X	<u>2.452</u>	=	<u>.066</u>	
<u>Wages</u>	<u>76.9</u>	X	<u>1.074</u>	=	<u>.826</u>	
		X		=		Schedule 18 Cost
100.0%		Weighted Index	=	<u>1.112</u>	X	\$ <u>1,493.28</u>
					Schedule 19 Cost	= \$ <u>1,660.53</u>
						\$ _____

III Misc. Add'l Costs/Adjustments\* Landing Construction Crew



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - RIGGING YARDING & LOADING - WESTERN OREGON  
Operations - HIGHLAND LOGGING - RIGGING COST - MEDIUM YARDER - ADD'L POLES  
Reference for Cost Table ILLUSTRATION 2 - TABLE 17

I Determining Hourly Cost

		<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A.	<u>Machine Rates</u> Machine/Time			
1.	<u>MEDIUM YARDER - SKAGET Bu 800</u> <u>12 HOURS FIXED COST</u> <u>8 HOURS OPERATING COST</u>	<u>12 x 3.52</u>	<u>8 x 8.14</u>	<u>107.36</u>
2.	<u>CHAINSAW</u> <u>12 HOURS FIXED COST</u>	<u>12 x .31</u>		<u>3.72</u>
3.	<u>MOBILE LOADER - TL-98</u> <u>12 HOURS FIXED COST</u> <u>1 HOUR OPERATING</u>	<u>12 x 6.32</u>	<u>5.53</u>	<u>81.37</u>
4.	<u>TRACTOR w/ DOZER - D7F</u> <u>- LANDING CONSTRUCTION -</u> <u>8 HOURS MACHINE COST</u>	<u>8 x 6.24</u>	<u>8 x 7.32</u>	<u>108.48</u>
5.				
6.				
Total Machine Rate . . . . \$				<u>300.93</u>

B.	<u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1.	<u>YARDING ENGINEER (12 HOURS)</u>	<u>12 x 8.88</u>	<u>106.56</u>
2.	<u>RIGGING SLINGER (12 HOURS)</u>	<u>12 x 8.28</u>	<u>99.36</u>
3.	<u>2 CHOKER SETTER (12 HOURS)</u>	<u>24 x 7.39</u>	<u>177.36</u>

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4.	Chaser	(12 hrs.)	12 x 7.67	92.04
5.	Hook Tender	(12 hrs.)	12 x 9.65	115.80
6.	Loader Engineer	(12 hrs.)	12 x 9.32	111.84
* 7.	Chaser	( 8 hrs.)	8 x 7.67	61.36
* 8.	Tractor Operator	( 8 hrs.)	8 x 8.75	70.00

Total Wage Rate \$ 834.08

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 1,135.25 X 10% . . . . . \$ 113.52

D. Total Costs . . . . . \$ 1,248.77

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>23.5</u>	X	<u>1.080</u>	=	<u>.254</u>	
<u>Oil and Gas</u>	<u>3.0</u>	X	<u>2.452</u>	=	<u>.074</u>	
<u>Wages</u>	<u>73.5</u>	X	<u>1.074</u>	=	<u>.789</u>	
		X		=		Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.117</u>	X	\$ <u>1,248.77</u>
			Schedule 19 Cost	=	\$	<u>1,394.88</u>
					\$	<u>          </u>

III Misc. Add'l Costs/Adjustments

\* Landing construction crew



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - RIGGING YARDING & LOADING - WESTERN OREGON  
(18) Operations - HIGHLAND LOGGING - RIGGING COSTS - 65' TOWER - 1ST POLE  
Reference for Cost Table ILLUSTRATION 2 TABLE 17

I Determining Hourly Cost

		Fixed	Operating	Total
A.	<u>Machine Rates</u> Machine/Time			
* 1.	<u>65' Tower w/ Beaver Loader</u> <u>6 Hours Fixed Costs</u> <u>2 Hours Operating Costs</u>	6 x 7.70	2 x 9.92	66.04
2.	<u>CUMMINS</u> <u>6 Hours Fixed Costs</u>	6 x .31		1.86
3.	<u>Mobile Loader - TL-98</u> <u>6 Hours Fixed Costs</u> <u>2 Hours Operating Costs</u>	6 x 6.32	2 x 5.53	48.98
** 4.	<u>Tractor Digger - D7F</u> <u>6 Hours Fixed Costs</u> <u>4 Hours Fixed Costs</u>	6 x 6.24	4 x 7.32	66.72
5.				
6.				
Total Machine Rate . . . .		\$ 183.60		

B. Wage Rates (Adjusted Hourly Rate)  
Crew Position/Time

		Hour Rate	Total
1.	<u>YARDING ENGINEER (6 hours)</u>	6 x 8.88	53.28
2.	<u>RIGGING SKIDDER (6 hours)</u>	6 x 8.28	49.68
3.	<u>2 CHOKER SETTERS (6 hours)</u>	12 x 7.39	88.68

(C-2.b-48)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4.	<u>Chaser</u>	<u>(6 hrs.)</u>	<u>6 x 7.67</u>	<u>46.02</u>
5.	<u>Hook Tender</u>	<u>(6 hrs.)</u>	<u>6 x 9.65</u>	<u>57.90</u>
6.	<u>Loading Engineer</u>	<u>(6 hrs.)</u>	<u>6 x 9.32</u>	<u>55.92</u>
** 7.	<u>Chaser</u>	<u>(6 hrs.)</u>	<u>6 x 7.67</u>	<u>46.02</u>
** 8.	<u>Tractor Operator</u>	<u>(6 hrs.)</u>	<u>6 x 8.75</u>	<u>52.50</u>
Total Wage Rate			\$ <u>450.00</u>	

C. General and Administrative Costs  
10% of Machine and Wage Rates\$ 633.60 X 10% . . . . . \$ 63.36D. Total Costs . . . . . \$ 696.96II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>27.0</u>	X	<u>1.080</u>	=	<u>.292</u>	
<u>Oil and Gas</u>	<u>2.0</u>	X	<u>2.452</u>	=	<u>.049</u>	
<u>Wages</u>	<u>71.0</u>	X	<u>1.074</u>	=	<u>.763</u>	
<u>                    </u>	<u>                    </u>	X	<u>                    </u>	=	<u>                    </u>	Schedule 18 Cost
100.0% Weighted Index = <u>1.104</u> X \$ <u>696.96</u>						
Schedule 19 Cost = \$ <u>769.44</u>						
						\$ <u>                    </u>

III Misc. Add'l Costs/Adjustments

\* 3 hrs. to rig and 3 hrs. to take down for highway transportation

\*\* Landing construction



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - Rigging, Yarding & Loading - Western Oregon  
Operations - HIGHLAND LOGGING - Rigging Cost - 65' Tower - ADD'L POLES

Reference for Cost Table ILLUSTRATION 2 TABLE 17

I Determining Hourly Cost

		<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A.	<u>Machine Rates</u> Machine/Time			
1.	<u>65' Tower w/ Boxer Yarder</u> <u>2 Hours Fixed Costs</u> <u>2 Hours Operating Costs</u>	<u>2 x 7.70</u>	<u>2 x 9.92</u>	<u>35.24</u>
2.	<u>Chainsaw</u> <u>2 Hours Fixed Costs</u>	<u>2 x .31</u>		<u>.62</u>
3.	<u>Mobile Yarder TL-98</u> <u>2 Hours Fixed Costs</u> <u>1 Hour Operating Cost</u>	<u>2 x 6.32</u>	<u>5.53</u>	<u>18.17</u>
4.	<u>Traction Dozer D7F</u> <u>4 Hours Fixed Costs</u> <u>4 Hours Operating Costs</u>	<u>4 x 6.24</u>	<u>4 x 7.32</u>	<u>54.24</u>
5.				
6.				

Total Machine Rate . . . . \$ 108.27

B.	<u>Wage Rates (Adjusted Hourly Rate)</u> Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1.	<u>Yarding Engineer - (2 Hours)</u>	<u>2 x 8.88</u>	<u>17.76</u>
2.	<u>Rigging Skidder (2 Hours)</u>	<u>2 x 8.28</u>	<u>16.56</u>
3.	<u>2 Choker Setters (2 Hours)</u>	<u>4 x 7.39</u>	<u>29.56</u>

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4.	<u>Chaser</u>	<u>(2 hrs.)</u>	<u>2 x 7.67</u>	<u>15.34</u>
5.	<u>Hook Tender</u>	<u>(2 hrs.)</u>	<u>2 x 9.65</u>	<u>19.30</u>
6.	<u>Landing Engineer</u>	<u>(2 hrs.)</u>	<u>2 x 9.32</u>	<u>18.64</u>
* 7.	<u>Chaser</u>	<u>(4 hrs.)</u>	<u>4 x 7.67</u>	<u>30.68</u>
* 8.	<u>Tractor Operator</u>	<u>(4 hrs.)</u>	<u>4 x 8.75</u>	<u>35.00</u>
Total Wage Rate			\$	<u>182.84</u>

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 291.11 X 10% . . . . . \$ 29.11

D. Total Costs . . . . . \$ 320.22

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>33.2</u>	X	<u>1.080</u>	=	<u>.359</u>	
<u>Oil and Gas</u>	<u>4.0</u>	X	<u>2.452</u>	=	<u>.098</u>	
<u>Wages</u>	<u>62.8</u>	X	<u>1.074</u>	=	<u>.674</u>	
		X		=		Schedule 18 Cost
100.0% Weighted Index =						
			<u>1.131</u>	X	\$	<u>320.22</u>
Schedule 19 Cost =						\$ <u>362.17</u>
						\$ _____

III Misc. Add'l Costs/Adjustments

\* Landing construction



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - RIGGING YARDING & LOADING - WESTERN OREGON  
(19) Operations - HILLSIDE LOGGING - RIGGING COSTS - 110' TOWER - 1<sup>ST</sup> POLE  
Reference for Cost Table ILLUSTRATION 2 TABLE 17

I Determining Hourly Cost

		<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A.	<u>Machine Rates</u> Machine/Time			
* 1.	<u>110' TOWER W/ BERNER YARDER</u> <u>6 HOURS FIXED COSTS</u> <u>2 HOURS OPERATING COSTS</u>	<u>6 x 11.59</u>	<u>2 x 13.38</u>	<u>96.30</u>
2.	<u>CITYMAN SAW</u> <u>6 HOURS FIXED COSTS</u>	<u>6 x .31</u>		<u>1.86</u>
3.	<u>MOBILE LOADER - TL-98</u> <u>6 HOURS FIXED COSTS</u> <u>2 HOURS OPERATING COSTS</u>	<u>6 x 6.32</u>	<u>2 x 5.53</u>	<u>48.98</u>
** 4.	<u>TRACTOR DOZER - D7F</u> <u>6 HOURS FIXED COSTS</u> <u>4 HOURS OPERATING COSTS</u>	<u>6 x 6.24</u>	<u>4 x 7.32</u>	<u>66.72</u>
5.				
6.				
Total Machine Rate . . . . \$				<u>213.86</u>

B.	<u>Wage Rates (Adjusted Hourly Rate)</u> Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1.	<u>YARDER ENGINEER (6 HOURS)</u>	<u>6 x 8.88</u>	<u>53.28</u>
2.	<u>RIGGING SKINGER (6 HOURS)</u>	<u>6 x 8.28</u>	<u>49.68</u>
3.	<u>2 CHAIN SETTERS (6 HOURS)</u>	<u>12 x 7.39</u>	<u>88.68</u>

(C-2. b(9))

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4.	<u>Chaser</u>	<u>(6 hrs.)</u>	<u>6 x 7.67</u>	<u>46.02</u>
5.	<u>Hook Tender</u>	<u>(6 hrs.)</u>	<u>6 x 9.65</u>	<u>57.90</u>
6.	<u>Landing Engineer</u>	<u>(6 hrs.)</u>	<u>6 x 9.32</u>	<u>55.92</u>
** 7.	<u>Chaser</u>	<u>(6 hrs.)</u>	<u>6 x 7.67</u>	<u>46.02</u>
** 8.	<u>Tractor Operator</u>	<u>(6 hrs.)</u>	<u>6 x 8.75</u>	<u>52.50</u>
Total Wage Rate			\$ <u>450.00</u>	

C. General and Administrative Costs  
10% of Machine and Wage Rates\$ 663.86 X 10% . . . . . \$ 66.39D. Total Costs . . . . . \$ 730.25II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase, Factor	=	Current Index	
<u>Equipment</u>	<u>30.3</u>	X	<u>1.080</u>	=	<u>.327</u>	
<u>Oil and Gas</u>	<u>2.0</u>	X	<u>2.452</u>	=	<u>.049</u>	
<u>Wages</u>	<u>67.7</u>	X	<u>1.074</u>	=	<u>.727</u>	
		X		=		Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.103</u>	X	\$ <u>730.25</u>
						Schedule 19 Cost = \$ <u>805.47</u>
						\$ <u>          </u>

III Misc. Add'l Costs/Adjustments

\* 3 hrs. to rig and 3 hrs. to take down for highway transportation

\*\* Tractor and crew for landing construction



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - RIGGING, YARDING & LOADING - WESTERN OREGON

Operations - HIGHLAND LOGGING - RIGGING COST - 110' TOWER - ADOL POLE

Reference for Cost Table ILLUSTRATION 2 TABLE 17

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>110' Tower w/ BERGER YARDER</u> <u>2 Hours Fixed Costs</u> <u>2 Hours Operating Costs</u>	<u>2 x 11.59</u>	<u>2 x 13.38</u>	<u>49.94</u>
2. <u>CHAINSAW</u> <u>2 Hours Fixed Costs</u>	<u>2 x .31</u>		<u>.61</u>
3. <u>MOBILE LOADER - TL-98</u> <u>2 Hours Fixed Costs</u> <u>1 Hour Operating Costs</u>	<u>2 x 6.32</u>	<u>5.53</u>	<u>18.17</u>
4. <u>TRACTOR DOZER</u> <u>8 Hours Fixed Costs</u> <u>4 Hours Operating Costs</u>	<u>4 x 6.24</u>	<u>4 x 7.32</u>	<u>54.24</u>
5. _____ _____ _____	_____	_____	_____
6. _____ _____ _____	_____	_____	_____

Total Machine Rate . . . . \$ 122.96

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1. <u>YARDING ENGINEER (2 Hours)</u>	<u>2 x 8.88</u>	<u>17.76</u>
2. <u>RIGGING Slinger (2 hours)</u>	<u>2 x 8.28</u>	<u>16.56</u>
3. <u>2 Chain Saws (2 hours)</u>	<u>2 x 7.39</u>	<u>14.78</u>

(C-2.b-(9))

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4.	<u>Chaser</u>	<u>(2 hrs.)</u>	<u>2 x 7.67</u>	<u>15.34</u>
5.	<u>Hook Tender</u>	<u>(2 hrs.)</u>	<u>2 x 9.65</u>	<u>19.30</u>
6.	<u>Landing Engineer</u>	<u>(2 hrs.)</u>	<u>2 x 9.32</u>	<u>18.64</u>
* 7.	<u>Chaser</u>	<u>(4 hrs.)</u>	<u>4 x 7.67</u>	<u>30.68</u>
* 8.	<u>Tractor Operator</u>	<u>(4 hrs.)</u>	<u>4 x 8.75</u>	<u>35.00</u>
Total Wage Rate			\$ <u>168.06</u>	

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 291.02 X 10% . . . . . \$ 29.10

D. Total Costs . . . . . \$ 320.12

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>38.2</u>	X	<u>1.080</u>	=	<u>.413</u>	
<u>Oil and Gas</u>	<u>4.1</u>	X	<u>2.452</u>	=	<u>.101</u>	
<u>Wages</u>	<u>57.7</u>	X	<u>1.074</u>	=	<u>.620</u>	
		X		=		Schedule 18 Cost
100.0% Weighted Index =					<u>1.134</u>	X \$ <u>320.12</u>
					Schedule 19 Cost =	\$ <u>363.02</u>
						\$ _____

III Misc. Add'l Costs/Adjustments

\* Tractor and crew for landing construction

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9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - RIGGING YARDING & LOADING - WESTERN OREGON  
(20) Operations - SKYLINE LOGGING - YARDING - 120' PORTABLE TOWER / YARDER

Reference for Cost Table ILLUSTRATION 2 - TABLES - 24 & 25

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>120' PORT. TOWER W/ SKAGET YARDER</u> <u>SKY CAR &amp; SINGLE DRUM</u>	<u>41.28</u>	<u>27.75</u>	<u>69.03</u>
2. <u>CHAIN SAW</u> <u>FUEL COST / HOUR - HOURLY OPERATION</u> <u>RATE BASED ON 3 HOURS / DAY</u>	<u>.31</u>	<u>3/8 x .79</u>	<u>.61</u>
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$			<u>69.64</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1. <u>SIDE PO</u>	<u>10.59</u>	<u>10.59</u>
2. <u>YARDING ENGINEER</u>	<u>8.88</u>	<u>8.88</u>
3. <u>3 CITICOR SETTERS</u>	<u>3 x 7.39</u>	<u>22.17</u>

(C-2. p. 20)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4.	<u>Chaser</u>	<u>7.67</u>	<u>7.67</u>
5.	<u>Head Rigger</u>	<u>8.85</u>	<u>8.85</u>
6.	<u></u>	<u></u>	<u></u>
7.	<u></u>	<u></u>	<u></u>
8.	<u></u>	<u></u>	<u></u>

Total Wage Rate \$ 58.16C. General and Administrative Costs  
10% of Machine and Wage Rates\$ 127.80 X 10% . . . . . \$ 12.78D. Total Costs . . . . . \$ 140.58II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>51.4</u>	X	<u>1.080</u>	=	<u>.555</u>	
<u>Oil and Gas</u>	<u>3.1</u>	X	<u>2.452</u>	=	<u>.076</u>	
<u>Wages</u>	<u>45.5</u>	X	<u>1.074</u>	=	<u>.489</u>	
<u></u>		X		=		Schedule 18 Cost

100.0% Weighted Index = 1.120 X \$ 140.58Schedule 19 Cost = \$ 157.45/hr.\$ 2.624/min.III Misc. Add'l Costs/Adjustments



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - RIGGING YARDING & LOADING - WESTERN OREGON  
(21) Operations - SKYLINE LOGGING - LOADING - 120' PORTA TOWER W/ YARDGR

Reference for Cost Table ILLUSTRATION 2 - TABLE 24

I Determining Hourly Cost

		<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A.	<u>Machine Rates</u> Machine/Time			
1.	<u>MOBILE LOADER - Link Belt TL-98</u>	<u>6.32</u>	<u>.75 x 5.53</u>	<u>10.47</u>
X	<u>FIXED COST/HOUR PLUS HOURLY</u>			
	<u>OPERATING RATE AT 75%</u>			
2.	_____	_____	_____	_____
	_____			
	_____			
3.	_____	_____	_____	_____
	_____			
	_____			
4.	_____	_____	_____	_____
	_____			
	_____			
5.	_____	_____	_____	_____
	_____			
	_____			
6.	_____	_____	_____	_____
	_____			
	_____			
Total Machine Rate . . . . \$			<u>10.47</u>	

B.	<u>Wage Rates (Adjusted Hourly Rate)</u> Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1.	<u>LOADING ENGINEER</u>	<u>8.88</u>	<u>8.88</u>
2.	_____	_____	_____
3.	_____	_____	_____

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4.	_____	_____	_____
5.	_____	_____	_____
6.	_____	_____	_____
7.	_____	_____	_____
8.	_____	_____	_____

Total Wage Rate \$ 8.88

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 19.35 X 10% . . . . . \$ 1.93

D. Total Costs . . . . . \$ 21.28

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>.491</u>	X	<u>1.080</u>	=	<u>.530</u>	
<u>Oil and Gas</u>	<u>.050</u>	X	<u>2.452</u>	=	<u>.123</u>	
<u>Wages</u>	<u>.459</u>	X	<u>1.074</u>	=	<u>.493</u>	
_____	_____	X	_____	=	_____	Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.146</u>	X	\$ <u>21.28</u>
				Schedule 19 Cost	=	\$ <u>24.39/hr.</u>
						\$ <u>0.407/min.</u>

III Misc. Add'l Costs/Adjustments

\* Reduction of 25% operating time reflects waiting time for yarder and  
machine down time.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - Logging, Yarding & Loading - Western Oregon  
(22) Operations - Skyline Logging - Rigging Cost - 15' Pole & Add'l Poles -  
Reference for Cost Table ILLUSTRATION 2 - TABLE 23

I Determining Hourly Cost

		<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A.	<u>Machine Rates</u> Machine/Time			
* 1.	<u>Tower/Climbing/Skyline/Crew</u> 16 Hours Fixed Costs 6 Hours Fuel Costs	16 x 41.28	6 x 3.77	683.10
2.	<u>Climb Saw</u> 16 Hours Fixed Costs	16 x .31		4.96
3.	<u>Mobile Loader - TL-98</u> 16 Hours Fixed Costs 2 Hours Operating Costs	16 x 6.32	2 x 5.53	112.18
** 4.	<u>Traction Hauler D7F</u> 11 Hours Fixed Costs 10 Hours Operating Costs	11 x 6.24	10 x 7.32	141.84
5.				
6.				
Total Machine Rate . . . .		\$	942.08	

\*\*\* B. Wage Rates (Adjusted Hourly Rate)  
Crew Position/Time

		<u>Hour Rate</u>	<u>Total</u>
1.	<u>SIDE ROO (18 Hours)</u>	18 x 10.59	190.62
2.	<u>YARDING ENGINEER (18 Hours)</u>	18 x 8.88	159.84
3.	<u>3 CHOKER SETTERS (18 Hours)</u>	54 x 7.39	399.06





9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - RIGGING YARDING & LOADING - WESTERN OREGON  
Operations - SKYLINE LOGGING - RIGGING COSTS - 1<sup>st</sup> TAIL HOLE  
Reference for Cost Table ILLUSTRATION 2 TABLE 23

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
*1. <u>Tower / Limb / Skyline / Drum</u> <u>6 Hours Fixed Costs</u> <u>6 Hours Fuel Costs -</u>	<u>6 x 44.28</u>	<u>6 x 3.77</u>	<u>270.30</u>
*2. <u>TRACTOR HOZER - D7F</u> <u>6 Hours Fixed Costs</u> <u>2 Hours Operating Costs.</u>	<u>6 x 6.24</u>	<u>2 x 7.32</u>	<u>52.08</u>
3. <u>CATERPILLAR</u> <u>1 HOUR MACHINE COSTS.</u>	<u>.31</u>	<u>.79</u>	<u>1.10</u>
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$			<u>323.48</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate)		<u>Hour Rate</u>	<u>Total</u>
Crew Position/Time			
1. <u>SIDE POD</u> (6 Hours)	<u>6 x 10.59</u>		<u>63.54</u>
2. <u>YARDER ENGINEER</u> (6 Hours)	<u>6 x 8.88</u>		<u>53.28</u>
3. <u>3 CHOKE SETTERS</u> (6 Hours)	<u>18 x 7.39</u>		<u>133.02</u>

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4.	Chaser	(6 hrs.)	6 x 7.67	46.02
5.	Head Rigger	(16 hrs.)	16 x 8.85	141.60
6.	Landing Engineer	(6 hrs.)	6 x 9.32	55.92
7.	Tractor Operator	(6 hrs.)	6 x 8.75	52.50
8.				
Total Wage Rate			\$	545.88

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 869.36 X 10% . . . . . \$ 86.94

D. Total Costs . . . . . \$ 956.30

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	35.1	X	1.080	=	.379	
<u>Oil and Gas</u>	2.1	X	2.452	=	.051	
<u>Wages</u>	62.8	X	1.074	=	.674	
		X		=		Schedule 18 Cost
100.0%		Weighted Index	=	1.104	X	\$ 956.30
Schedule 19 Cost					=	\$ 1,055.75
						\$

III Misc. Add'l Costs/Adjustments

- \* In lieu of operating cost, allowance made for fuel of yarder/skycar
- \*\* Aid in rigging tail hold, anchors, pulling lines, etc.
- 
-



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - RIGHTING GRADING & LOGGING - WESTERN OREGON  
Operations - SKYLINE LOGGING - LOGGING COST - ADD L TAIL HOLDS  
Reference for Cost Table ILLUSTRATION 2 - TABLE 23

I Determining Hourly Cost

		<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A.	<u>Machine Rates</u> Machine/Time			
* 1.	<u>TOWER / GRADER / CAT / DRUM</u> <u>6 HOURS FIXED COSTS</u> <u>6 HOURS FUEL COSTS</u>	<u>6x 41.28</u>	<u>6x 3.77</u>	<u>270.30</u>
2.	<u>CHAINSAW</u> <u>1 HOUR MACHINE COST</u>	<u>.31</u>	<u>.79</u>	<u>1.10</u>
* 3.	<u>TRACTOR HOZER - CAT DTF</u> <u>6 HOURS FIXED COST</u> <u>2 HOURS EXCESSIVE COST</u>	<u>6x 6.24</u>	<u>2x 7.32</u>	<u>52.08</u>
4.				
5.				
6.				
Total Machine Rate . . . .		\$	<u>323.48</u>	

B.	<u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1.	<u>SIDE BOB</u> (6 HOURS)	<u>6x 10.59</u>	<u>63.54</u>
2.	<u>GRADER ENGINEER</u> (6 HOURS)	<u>6x 8.88</u>	<u>53.28</u>
3.	<u>3 CHAPER SETTERS</u> (6 HOURS)	<u>18x 7.39</u>	<u>133.02</u>

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4.	<u>Chaser</u>	<u>(6 hrs.)</u>	<u>6 x 7.67</u>	<u>46.02</u>
5.	<u>Head Rigger</u>	<u>(6 hrs.)</u>	<u>6 x 8.85</u>	<u>53.10</u>
6.	<u>Tractor Operator</u>	<u>(6 hrs.)</u>	<u>6 x 8.75</u>	<u>52.50</u>
7.	<u>                    </u>	<u>                </u>	<u>                </u>	<u>                </u>
8.	<u>                    </u>	<u>                </u>	<u>                </u>	<u>                </u>
Total Wage Rate			\$	401.46

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 724.94	X 10%	\$ 72.49
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D. Total Costs . . . . .	\$ 797.43
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## II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
Equipment	41.0	X	1.080	=	.443	
Oil and Gas	3.6	X	2.452	=	.088	
Wages	55.4	X	1.074	=	.595	
		X		=		Schedule 18 Cost
	100.0%	Weighted Index	=	1.126	X \$	797.43
			Schedule 19 Cost	=	\$	897.91
					\$	

### III Misc. Add'l Costs/Adjustments

\* In lieu of operating cost - allowance made for fuel of yarder/sky-car.

**\*\* Aid in rigging tail hold, anchors, pulling lines, etc.**



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - Logging Yarding & Loading - Western Oregon  
(23) Operations - Highland Swinging - Hot & Cold Deck Swinging -  
Reference for Cost Table ILLUSTRATION 2 - TABLES 26, 27, & 29

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> <u>Machine/Time</u>			
1. <u>MEDIUM YARDER - SKAGIT BU-80C</u> <u>W/ RIGGED TREE -</u> <u>MACHINE RATE / HOUR</u>	<u>3.52</u>	<u>8.14</u>	<u>11.66</u>
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$			<u>11.66</u>

B. <u>Wage Rates (Adjusted Hourly Rate)</u> <u>Crew Position/Time</u>	<u>Hour Rate</u>	<u>Total</u>
1. <u>YARDING ENGINEER -</u>	<u>8.88</u>	<u>8.88</u>
2. <u>CHIEF</u>	<u>7.67</u>	<u>7.67</u>
3. _____	_____	_____

(C-2: b-23)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
 5. \_\_\_\_\_  
 6. \_\_\_\_\_  
 7. \_\_\_\_\_  
 8. \_\_\_\_\_

Total Wage Rate \$ 16.55

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 28.21 X 10% . . . . . \$ 2.82

D. Total Costs . . . . . \$ 31.03

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>.326</u>	X	<u>1.080</u>	=	<u>.352</u>	
<u>Oil and Gas</u>	<u>.087</u>	X	<u>2.452</u>	=	<u>.213</u>	
<u>Wages</u>	<u>.587</u>	X	<u>1.074</u>	=	<u>.630</u>	
		X		=		Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.195</u>	X	\$ <u>31.03</u>
						Schedule 19 Cost = \$ <u>37.08/hr.</u> <u>.618/min.</u> \$ _____

III Misc. Add'l Costs/Adjustments

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - Logging Yarding & Loading - Western Oregon  
(24) Operations - Highland Spawning - Logging Cost - Logging Pole  
Reference for Cost Table ILLUSTRATION 2 TABLE 28

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>MEDIUM GRADER - SKAGET BU 80C</u> <u>20 HOURS FIXED COSTS</u> <u>4 HOURS OPERATING COSTS</u>	<u>20X 3.52</u>	<u>4X 8.14</u>	<u>102.96</u>
2. <u>TRACTOR DOZER - CAT D7F</u> <u>(LANDING CONSTRUCTION)</u> <u>4 HOURS MACHINE COST</u>	<u>4X 6.24</u>	<u>4X 7.32</u>	<u>54.24</u>
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$			<u>157.20</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1. <u>YARDING ENGINEER - (20 HOURS)</u>	<u>20 X 8.88</u>	<u>177.60</u>
2. <u>CHASER (20 HOURS)</u>	<u>20 X 7.67</u>	<u>153.40</u>
3. <u>TRACTOR OPERATOR (4 HOURS)</u>	<u>4 X 8.75</u>	<u>35.00</u>

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 366.00

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 523.20 X 10% . . . . . \$ 52.32

D. Total Costs . . . . . \$ 575.52

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	26.9	X	1.080	=	.291	
<u>Oil and Gas</u>	3.2	X	2.452	=	.078	
<u>Wages</u>	69.9	X	1.074	=	.751	
		X		=		Schedule 18 Cost
	100.0%	Weighted Index	=	1.120	X	\$ 575.52
				Schedule 19 Cost	=	\$ 644.58
						\$ _____

III Misc. Add'l Costs/Adjustments

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - RIGGING YARDING & LOADING - WESTERN & EASTERN CROW  
(25) Operations - COLD DECK LOADING - TL 98

Reference for Cost Table ILLUSTRATION 2 TABLE 30

I Determining Hourly Cost

		<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A.	<u>Machine Rates</u> Machine/Time			
* 1.	<u>MOBILE LOADER - LINK BELT TL-98</u> <u>8 HOURS MACHINE COST</u>	<u>8 x 6.32</u>	<u>8 x 5.53</u>	<u>94.80</u>
2.				
3.				
4.				
5.				
6.				
Total Machine Rate . . . . \$				<u>94.80</u>

B.	<u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
* 1.	<u>LOADING ENGINEER - (8 HOURS)</u>	<u>8 x 8.88</u>	<u>71.04</u>
2.			
3.			

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 71.04

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 165.84 X 10% . . . . . \$ 16.58

D. Total Costs . . . . . \$ 182.42

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>50.9</u>	X	<u>1.080</u>	=	<u>.550</u>	
<u>Oil and Gas</u>	<u>6.3</u>	X	<u>2.452</u>	=	<u>.154</u>	
<u>Wages</u>	<u>42.8</u>	X	<u>1.074</u>	=	<u>.460</u>	
_____		X		=		Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.164</u>	X	\$ <u>182.42</u>
				Schedule 19 Cost	=	\$ <u>212.34</u>
						\$ <u>1.29/M</u>

III Misc. Add'l Costs/Adjustments

\* Adjust to cost per MBM (Net Log Scale Loaded)

Total Production Per 8 hr. day - 165 M per day

\$212.34/165 = \$1.29/M

(Mobile Loader TL98)



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - Rigging Yarding & Loading - Western & Eastern Oregon  
(26) Operations - Cold Deck Loading - HC-98

Reference for Cost Table Illustration 2 Table 30

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. _____ _____			
2. _____ _____			
* 3. <u>Mobile Loader - Link Belt HC-98</u>	<u>8 x 8.34</u>	<u>8 x 7.72</u>	<u>128.48</u>
<u>8 hours machine cost</u>			

Total Machine Rate . . . \$ 128.48

B. <u>Wage Rates</u> (Adjusted Hourly Rate)		
Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
* 1. <u>Loading Engineer - (8 hours)</u>	<u>8 x 8.88</u>	<u>71.04</u>

(C-2, b-26)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4.			
5.			
6.			
7.			
8.			

Total Wage Rate \$ 71.04C. General and Administrative Costs  
10% of Machine and Wage Rates\$ 199.52 X 10% . . . . . \$ 19.95D. Total Costs . . . . . \$ 219.47II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>59.2</u>	X	<u>1.080</u>	=	<u>.639</u>	
<u>Oil and Gas</u>	<u>5.2</u>	X	<u>2.452</u>	=	<u>.128</u>	
<u>Wages</u>	<u>35.6</u>	X	<u>1.074</u>	=	<u>.382</u>	
		X		=		Schedule 13 Cost
	100.0%	Weighted Index	=	<u>1.149</u>	X	\$ <u>219.47</u>
				Schedule 19 Cost	=	\$ <u>252.17</u>
						\$ <u>1.52/M</u>

III Misc. Add'l Costs/Adjustments

\* Adjustment to Cost Per MBM (Net Log Scale Loaded)

Total Production Per 8 hour day - 165 M per day\$252.17 / 165 M = \$1.52/M(Mobile loader HC 98)



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - Rigging, Grading & Loading - Western & Eastern Oregon  
(27) Operations - Misc Small Scale Operations - Light Mobile  
Loader Loading (Cold Deck) Loading Costs -

Reference for Cost Table ILLUSTRATION 2 TABLE 31

I Determining Hourly Cost

		<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A.	<u>Machine Rates</u> Machine/Time			
* 1.	<u>MOBILE LOADER - FOMBY MODEL M 8x</u> <u>Loader</u> <u>MACHINE OPERATION -</u>	<u>2.35</u>	<u>8x1.82</u>	<u>33.36,</u>
2.				
3.				
4.				
5.				
6.				
Total Machine Rate . . .		\$	<u>33.36</u>	

B.	<u>Wage Rates</u> (Adjusted Hourly Rate)		
	Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1.	<u>LOADING EQUIPMENT - (8 Hours)</u>	<u>8x 8.88</u>	<u>71.04</u>
2.	<u>LABORER (Helper) (8 Hours)</u>	<u>8x 6.82</u>	<u>54.56</u>
3.			

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 125.60

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 158.96 X 10% . . . . . \$ 15.90

D. Total Costs . . . . . \$ 174.80

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>16.6</u>	X	<u>1.080</u>	=	<u>.179</u>	
<u>Oil and Gas</u>	<u>4.4</u>	X	<u>2.452</u>	=	<u>.108</u>	
<u>Wages</u>	<u>79.0</u>	X	<u>1.074</u>	=	<u>.848</u>	
		X		=		Schedule 18 Cost
	100.0%	Weighted Index	<u>1.135</u>			\$ <u>174.80</u>
			Schedule 19 Cost	=		<u>198.40</u>
						\$ <u>1.32/MBM</u>

III Misc. Add'l Costs/Adjustments

1/ Although western Oregon wage rates were used, cost estimate may be considered appropriate for eastern Oregon.

\* Adjust to cost per MBM (Net scale loader)

Total est. Production per 8 hour day - 150 M.

BLM Manual Supplement \$198.40/150M = 1.323  
State Office-Oregon

Release 9-113  
5/1/74

91A



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - PICKING UNLOADING & LOADING - WESTERN & EASTERN OREGON 11  
(28) Operations - MISC SMALL SCALE OPERATIONS - PICKING COSTS - 1<sup>ST</sup> LOADING

Reference for Cost Table ILLUSTRATION 2 TABLE 31

I Determining Hourly Cost

	Fixed	Operating	Total
A. <u>Machine Rates</u> Machine/Time			
1. <u>MOBILE LOADER - FOMECY MODEL M1</u> <u>1 HOUR FIXED COST</u>	<u>2.35</u>		<u>2.35</u>
2. <u>LOADING TRUCK / TRACTOR</u> <u>(CHARGE FOR LOADER)</u> <u>1 HOUR OPERATING COST</u>		<u>5.53</u>	<u>5.53</u>
3. <u>TRACTOR - CAT D7F</u> <u>(ASST IN SET UP)</u> <u>1 HOUR MACHINE COST</u>	<u>6.24</u>	<u>7.32</u>	<u>13.56</u>
4. <u>CUMMINS</u> <u>1 HOUR FUEL COST</u>	<u>.31</u>		<u>.31</u>
5. _____	_____	_____	_____
6. _____	_____	_____	_____

Total Machine Rate . . . . \$ 21.75

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
* 1. <u>LOADING ENGINEER (1 Hour)</u>	<u>8.88</u>	<u>8.88</u>
2. <u>CATERPILLAR SETTER (1 Hour)</u>	<u>7.39</u>	<u>7.39</u>
3. <u>TRACTOR OPERATOR (1 Hour)</u>	<u>8.75</u>	<u>8.75</u>

(C-2, b-28)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
 5. \_\_\_\_\_  
 6. \_\_\_\_\_  
 7. \_\_\_\_\_  
 8. \_\_\_\_\_

Total Wage Rate \$ 25.02

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 46.77 X 10% . . . . . \$ 4.68

D. Total Costs . . . . . \$ 51.45

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>39.1</u>	X	<u>1.080</u>	=	<u>.422</u>	
<u>Oil and Gas</u>	<u>7.4</u>	X	<u>2.452</u>	=	<u>.181</u>	
<u>Wages</u>	<u>53.5</u>	X	<u>1.074</u>	=	<u>.575</u>	
		X		=		Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.178</u>	X	\$ <u>51.45</u>
						Schedule 19 Cost = \$ <u>60.61</u>
						\$ _____

III Misc. Add'l Costs/Adjustments

1/ Western Oregon wage rates used - however rigging costs may be  
considered to be identical for western and eastern Oregon.

\* Loading engineer drives logging truck carrier for loader.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

Activity - Logging Yarding & Logging - Western & Eastern Oregon  
Operations - Misc. Small Scale Operations - Logging Costs - Ass'l Landings -  
Reference for Cost Table ILLUSTRATION 2 - TABLE 31

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>MOBILE LOADER - RAMBLER MODEL 11.</u> <u>1/2 HOUR FIXED COST</u>	<u>.5 x 2.35</u>		<u>1.18</u>
2. <u>LOGGING TRUCK / TRACTOR</u> <u>(CARRIER FOR LOGS)</u> <u>1/2 HOUR OPERATING COST</u>		<u>.5 x 5.53</u>	<u>2.77</u>
3. <u>TRACTOR - CAT D7F</u> <u>(ASS'T IN SET UP)</u> <u>1/2 HOUR MACHINE COST</u>	<u>.5 x 6.24</u>	<u>.5 x 7.32</u>	<u>6.78</u>
4. <u>CHAIN SAW</u> <u>1/2 HOUR FIXED COST.</u>	<u>.5 x .31</u>		<u>.16</u>
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$			<u>10.89</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
* 1. <u>LOADING ENGINEER (1/2 Hour)</u>	<u>.5 x 8.88</u>	<u>4.44</u>
2. <u>CHOKER SETTER (1/2 Hour)</u>	<u>.5 x 7.39</u>	<u>3.70</u>
3. <u>TRACTOR OPERATOR (1/2 Hour)</u>	<u>.5 x 8.75</u>	<u>4.38</u>

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 12.52

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 23.41 X 10% . . . . . \$ 2.34

D. Total Costs . . . . . \$ 25.75

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>39.1</u>	X	<u>1.080</u>	=	<u>.422</u>	
<u>Oil and Gas</u>	<u>7.4</u>	X	<u>2.452</u>	=	<u>.181</u>	
<u>Wages</u>	<u>53.5</u>	X	<u>1.074</u>	=	<u>.575</u>	
		X		=		Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.178</u>	X	\$ <u>25.75</u>
				Schedule 19 Cost	=	\$ <u>30.33</u>
						\$ _____

III Misc. Add'l Costs/Adjustments

1/ Western Oregon wage rates used. However rigging costs may be considered to be identical for Western & Eastern Oregon.

\* Loading engineer drives logging truck carrier for loader

\*\* Mounted on old truck body



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - RIGGING GRADING + LOADING - WESTERN  
(29) Operations - MISC SMALL SCALE OPERATION - GRADING BY GRADER LOADER  
Reference for Cost Table ILLUSTRATION 2 - TABLE 32

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>WASHINGTON TRAK LOADER TL-6</u> <u>GRADER LOADER</u> <u>MACHINE RATE</u>	<u>9.46</u>	<u>6.25</u>	<u>15.71</u>
2. <u>CHAIN SAW</u> <u>FIXED COST - PLUS 3 HOURS</u> <u>PER DAY OPERATING COST.</u>	<u>.31</u>	<u>3/10 x .79</u>	<u>.61</u>
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$			<u>16.32</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate), Crew Position/Time (WESTERN OPERATION)	<u>Hour Rate</u>	<u>Total</u>
1. <u>LOADING ENGINEER</u>	<u>8.88</u>	<u>8.88</u>
2. <u>CHOKER SETTER</u>	<u>7.39</u>	<u>7.39</u>
3. <u>CHOKER</u>	<u>7.67</u>	<u>7.67</u>

(C-2, b-19)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
 5. \_\_\_\_\_  
 6. \_\_\_\_\_  
 7. \_\_\_\_\_  
 8. \_\_\_\_\_

Total Wage Rate

\$23.94

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 40.26 X 10% . . . . . \$ 4.03

D. Total Costs . . . . . \$44.29II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	37.5	X	1.080	=	.405	
<u>Oil and Gas</u>	3.0	X	2.452	=	.074	
<u>Wages</u>	59.5	X	1.074	=	.639	
		X		=		Schedule 18 Cost

100.0% Weighted Index = 1.118 X \$ 44.29

Schedule 19 Cost = \$ 49.52/hr

\$ 0.825/min.

III Misc. Add'l Costs/Adjustments

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - Rigging Yarding + Loading - Eastern Oregon  
(30) Operations - Misc Small Sale Operation - Yarding by Grapple Loader  
Reference for Cost Table Illustration 2 - Table 32

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>Wilmington Trak Loader TL-6</u>	<u>9.46</u>	<u>6.25</u>	<u>15.71</u>
<u>Grapple Loader</u>			
<u>Machine RPTC</u>			
2. <u>CHAIN SAW</u>	<u>.31</u>	<u>3/10 x .79</u>	<u>.61</u>
<u>Fixed Cost - plus 31 hours</u>			
<u>Per Day Operating Cost.</u>			
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$			<u>16.32</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate), Crew Position/Time (Eastern Oregon)	<u>Hour Rate</u>	<u>Total</u>
1. <u>Loader Operator</u>	_____	<u>7.17</u>
2. <u>Choker Setter</u>	_____	<u>5.63</u>
3. <u>Knot Bumper</u>	_____	<u>5.67</u>

(C 2, b-3c)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
 5. \_\_\_\_\_  
 6. \_\_\_\_\_  
 7. \_\_\_\_\_  
 8. \_\_\_\_\_

Total Wage Rate \$ 18.47

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 34.79 X 10% . . . . . \$ 3.48

D. Total Costs . . . . . \$ 38.27

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>43.5</u>	X	<u>1.080</u>	=	<u>.470</u>	
<u>Oil and Gas</u>	<u>3.4</u>	X	<u>2.452</u>	=	<u>.083</u>	
<u>Wages</u>	<u>53.1</u>	X	<u>1.074</u>	=	<u>.570</u>	
_____		X		=		Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.123</u>	X	\$ <u>38.27</u>
				Schedule 19 Cost	=	\$ <u>42.98</u>
						\$ _____

III Misc. Add'l Costs/Adjustments

\$42.98/\$49.52 = 87%

\$0.825/min x .87 = \$0.718



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - Rigging Yarding & Loading - Western Oregon  
(31) Operations - Misc Small Sale Operations - Rigging Cost - Yarder / Loader

Reference for Cost Table ILLUSTRATION 2 TABLE 33

I Determining Hourly Cost

		<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A.	<u>Machine Rates</u>			
	Machine/Time			
1.	<u>Washington Trak loader TL-6</u>	<u>9.46</u>	<u>6.25</u>	<u>15.71</u>
	<u>Yarder loader</u>			
	<u>1 Hour Machine Cost</u>			
2.	<u>CHAINSAW</u>	<u>.31</u>		<u>.31</u>
	<u>1 Hour Fixed Costs</u>			
3.				
4.				
5.				
6.				
Total Machine Rate . . . . \$			<u>16.02</u>	

B.	<u>Wage Rates (Adjusted Hourly Rate)</u>		
	Crew Position/Time ( <u>Western Oregon</u> )	<u>Hour Rate</u>	<u>Total</u>
1.	<u>LOADING ENGINEER - (1 Hour)</u>	<u>8.88</u>	
2.	<u>CHUCKER SETTER (1 Hour)</u>	<u>7.39</u>	
3.	<u>CHUCKER (1 Hour)</u>	<u>7.67</u>	

## Appendix 1, Page 167

(C-2-b-3i)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
 5. \_\_\_\_\_  
 6. \_\_\_\_\_  
 7. \_\_\_\_\_  
 8. \_\_\_\_\_

Total Wage Rate \$ 23.94

C. General and Administrative Costs  
 10% of Machine and Wage Rates

\$ 39.96 X 10% . . . . . \$ 4.00

D. Total Costs . . . . . \$ 43.96

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>37.3</u>	X	<u>1.080</u>	=	<u>.403</u>	
<u>Oil and Gas</u>	<u>2.8</u>	X	<u>2.452</u>	=	<u>.069</u>	
<u>Wages</u>	<u>59.9</u>	X	<u>1.074</u>	=	<u>.643</u>	
_____	_____	X	_____	=	_____	Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.115</u>	X	\$ <u>43.96</u>
			Schedule 19 Cost	=	\$ <u>49.02</u>	
					\$ _____	

III Misc. Add'l Costs/Adjustments

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - Rigging, Grading & Loading - Eastern Oregon  
(32) Operations - MISC. SMALL SCALE OPERATIONS - Rigging Cost - Grading / Loading  
Reference for Cost Table ILLUSTRATION 2 TABLE 33

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> <u>Machine/Time</u>			
1. <u>Washington Truck Loader TL-6</u> <u>Grader Loader -</u> <u>1 Hour - Machine Cost</u>	<u>9.46</u>	<u>6.25</u>	<u>15.71</u>
2. <u>Chain Saw</u> <u>1 Hour Fixed Costs</u>	<u>.31</u>		<u>.31</u>
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$			<u>16.02</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate) <u>Crew Position/Time (Eastern Ore)</u>	<u>Hour Rate</u>	<u>Total</u>
1. <u>Loader Operator (1 Hour)</u>		<u>7.17</u>
2. <u>Chain Setter (1 Hour)</u>		<u>5.63</u>
3. <u>Knot Bumper (1 Hour)</u>		<u>5.67</u>

(C-2, 1-32)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4.	_____	_____	_____
5.	_____	_____	_____
6.	_____	_____	_____
7.	_____	_____	_____
8.	_____	_____	_____

Total Wage Rate \$ 18.47C. General and Administrative Costs  
10% of Machine and Wage Rates\$ 34.49 X 10% . . . . . \$ 3.45D. Total Costs . . . . . \$ 37.94II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>43.2</u>	X	<u>1.080</u>	=	<u>.467</u>	
<u>Oil and Gas</u>	<u>3.2</u>	X	<u>2.452</u>	=	<u>.078</u>	
<u>Wages</u>	<u>53.6</u>	X	<u>1.074</u>	=	<u>.576</u>	
		X		=		Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.121</u>	X	\$ <u>37.94</u>
				Schedule 19 Cost	=	\$ <u>42.53</u>
						\$ _____

III Misc. Add'l Costs/Adjustments

_____
_____
_____
_____



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - Rigging YARDING & LOADING - WESTERN & EASTERN OREGON  
(33) Operations - Misc SMALL SCALE OPERATIONS - LOADING BY GRADER/LOPPER  
Reference for Cost Table ILLUSTRATION 2 TABLE 33

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>WASHINGTON TRAKLOPPER - TL-6</u> <u>GRADER LOPPER</u> <u>8 HOUR PRODUCTION DAY</u>	<u>8x946</u>	<u>8x625</u>	<u>125.68</u>
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$			<u>125.68</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time ( <u>WESTERN OREGON</u> )	<u>Hour Rate</u>	<u>Total</u>
1. <u>LOADING ENGINEER - (8 hours)</u>	<u>8x 8.88</u>	<u>71.04</u>
2. <u>CHOKER SETTER (8 hours)</u>	<u>8x 7.39</u>	<u>59.12</u>
3. <u>CHOKER (8 hours)</u>	<u>8x 7.67</u>	<u>61.36</u>

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 191.52

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 317.20 X 10% . . . . . \$ 31.72

D. Total Costs . . . . . \$ 348.92

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>36.8</u>	X	<u>1.080</u>	=	<u>.397</u>	
<u>Oil and Gas</u>	<u>2.8</u>	X	<u>2.452</u>	=	<u>.069</u>	
<u>Wages</u>	<u>60.4</u>	X	<u>1.074</u>	=	<u>.649</u>	
_____		X		=		Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.115</u>	X	\$ <u>348.92</u>
						Schedule 19 Cost = \$
						<u>389.05</u>
					2/	\$ <u>2.35/MBM</u>

III Misc. Add'l Costs/Adjustments

1/ Western Oregon wage rates used. However costs may be considered  
identical for Western and Eastern Oregon.

2/ Adjustment to cost per M (net log scale loaded) - Total production per 8  
hr. day - 165 M. \$389.05/165M = \$2.35



9333.3 - PRODUCTION COSTS

(Schedule 19)

Operating Cost Computations

b. Activity - Logging, Loading & Hauling - Western Oregon  
(34) Operations - Commercial Thinnings - Hauling w/ Light Crawler Tractor

Reference for Cost Table Illustration 2 Table 34

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>Light Crawler Tractor - Cat D4D</u> <u>MACHINE RATE</u>	<u>1.98</u>	<u>3.08</u>	<u>5.06</u>
2. <u>CITANSAN</u> <u>FIELD COST Plus 2 HOURS</u> <u>OPERATING COST PER DAY.</u>	<u>.31</u>	<u>2/8 x .79</u>	<u>.51</u>
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$			<u>5.57</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
* 1. <u>Tractor Operator (Small)</u>	<u>7.90</u>	<u>7.90</u>
2. _____	_____	_____
3. _____	_____	_____

(C-2.b-34)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
 5. \_\_\_\_\_  
 6. \_\_\_\_\_  
 7. \_\_\_\_\_  
 8. \_\_\_\_\_

Total Wage Rate \$ 7.90

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 13.47 X 10% . . . . . \$ 1.35

D. Total Costs . . . . . \$ 14.82

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>36.4</u>	X	<u>1.080</u>	=	<u>.393</u>	
<u>Oil and Gas</u>	<u>5.0</u>	X	<u>2.452</u>	=	<u>.123</u>	
<u>Wages</u>	<u>58.6</u>	X	<u>1.074</u>	=	<u>.629</u>	
_____	_____	X	_____	=	_____	Schedule 18 Cost

100.0% Weighted Index = 1.145 X \$ 14.82

Schedule 19 Cost = \$ 16.96

1/ \$ 23.50

\$ 0.392/min.

III Misc. Add'l Costs/Adjustments

\* Tractor Operator - setting and releasing chokers

1/ Adjustment Factor - Delay factor for complete skidding cycle from PNW-41

38.5% \$16.969 x 1.385 = \$23.50



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - DIGGING, YARDING & LOADING - WESTERN OREGON  
(35) Operations - COMMERCIAL TIMBERWORKS - YARDING W/ 4 WHEEL SKIDDER

Reference for Cost Table ILLUSTRATION 2 TABLE 35

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>4 WHEEL SKIDDER - JOHN DEERE 440B</u> <u>MACHINE RATE</u>	<u>1.92</u>	<u>3.81</u>	<u>5.73</u>
2. <u>CHAIN SAW</u> <u>TRUCK COST PLUS 2 HOURS</u> <u>OPERATING COST PER DAY</u>	<u>.31</u>	<u>2/8 x .79</u>	<u>.51</u>
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$			<u>6.24</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
* 1. <u>TRACTOR OPERATOR (SMALL)</u>	<u>7.90</u>	<u>7.90</u>
2. _____	_____	_____
3. _____	_____	_____

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 7.90

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 14.14 X 10% . . . . . \$ 1.41

D. Total Costs . . . . . \$ 15.55

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>39.8</u>	X	<u>1.080</u>	=	<u>.430</u>	
<u>Oil and Gas</u>	<u>4.3</u>	X	<u>2.452</u>	=	<u>.105</u>	
<u>Wages</u>	<u>55.9</u>	X	<u>1.074</u>	=	<u>.600</u>	
_____	_____	X	_____	=	_____	Schedule 18 Cost

100.0% Weighted Index = 1.135 X \$ 15.55

Schedule 19 Cost = \$ 17.64

1/ \$ 24.44

\$ 0.407/min.

III Misc. Add'l Costs/Adjustments

\* Skidder Operator. Setting & releasing chokers

1/ Adjustment Factor - Delay factor for complete skidding cycle from PNW-41

38.5% \$17.649 x 1.385 \$24.44



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - Logging Yarding & Loading - Western Oregon  
(36) Operations - COMMERCIAL THINNING - LOADING

Reference for Cost Table ILLUSTRATION 2 TABLE 36

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>LIGHT MOBILE LOADER - POWER M-</u> <u>MACHINE RATE</u>	<u>2.35</u>	<u>1.82</u>	<u>4.17</u>
2. <u>CATERPILLAR</u> <u>FIXED COST PLUS OPERATING</u> <u>COST FOR 3 HOURS PER DAY -</u>	<u>.31</u>	<u>3/8 x .79</u>	<u>.61</u>
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$			<u>4.78</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1. <u>LOADING ENGINEER</u>	<u>9.32</u>	<u>9.32</u>
2. <u>CATERPILLAR</u>	<u>7.67</u>	<u>7.67</u>
3. _____	_____	_____

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 16.99

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 21.77 X 10% . . . . . \$ 2.18

D. Total Costs . . . . . \$ 23.95

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>17.7</u>	X	<u>1.080</u>	=	<u>.191</u>	
<u>Oil and Gas</u>	<u>4.3</u>	X	<u>2.452</u>	=	<u>.105</u>	
<u>Wages</u>	<u>78.0</u>	X	<u>1.074</u>	=	<u>.838</u>	
		X		=		Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.134</u>	X	\$ <u>23.95</u>
						Schedule 19 Cost = \$ <u>27.16</u>
						\$ <u>0.452/min.</u>

III Misc. Add'l Costs/Adjustments

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - Rigging, Unloading & Loading - Western Oregon  
(37) Operations - Commercial Thinnings - Logging Co. - Crawler Tractor - 12" Landing  
Reference for Cost Table Illustration 2 TABLE 37

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>2 Light Tractors - CAT - D4D</u> <u>4 Hours Fixed Cost</u>	<u>8 x 1.98</u>		<u>15.84</u>
2. <u>CATERPILLAR</u> <u>5 Hours Fixed Cost</u>	<u>5 x .31</u>		<u>1.55</u>
3. <u>LIGHT MOBILE LOADER Ramsey M.</u> <u>2 Hours Machine Cost</u>	<u>2 x 2.35</u>	<u>2 x 1.82</u>	<u>8.34</u>
4. <u>LIGHT TRACTOR CAT D4D</u> <u>Landing Construction</u> <u>2 Hours Machine Rate</u>	<u>2 x 1.98</u>	<u>2 x 3.08</u>	<u>10.12</u>
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$			<u>35.85</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1. <u>2 Tractor Operators - (Small)</u> (5 Hours)	<u>10 x 7.90</u>	<u>79.00</u>
2. <u>LOADING ENGINEER</u> (2 Hours)	<u>2 x 9.32</u>	<u>18.64</u>
3. _____	_____	_____

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 97.64

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 133.49 X 10% . . . . . \$ 13.35

D. Total Costs . . . . . \$ 146.84

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>24.6</u>	X	<u>1.080</u>	=	<u>.266</u>	
<u>Oil and Gas</u>	<u>2.3</u>	X	<u>2.452</u>	=	<u>.056</u>	
<u>Wages</u>	<u>73.1</u>	X	<u>1.074</u>	=	<u>.785</u>	
_____	_____	X	_____	=	_____	Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.107</u>	X	\$ <u>146.84</u>
			Schedule 19 Cost	=	\$ <u>162.55</u>	
					\$	_____

III Misc. Add'l Costs/Adjustments

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - RIGGING, GRADING & LOADING - Western Oregon  
Operations - COMMERCIAL THINNING - Rigging Cost - CRAPPER TRACTOR - ADD. LOADING  
Reference for Cost Table ILLUSTRATION 2 TABLE 37

I Determining Hourly Cost

		<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u>				
	<u>Machine/Time</u>			
1.	<u>2 LIGHT TRACTORS - CAT D7D</u> <u>1 HOUR FIXED COST</u> <u>1 HOUR OPERATING</u>	<u>2 x 1.98</u>	<u>2 x 3.08</u>	<u>10.12</u>
2.	<u>CATERPILLAR</u> <u>1/2 HOUR FIXED COST</u>	<u>.5 x .31</u>		<u>.15</u>
3.	<u>LIGHT MOBILE LOMPER Ramsey M</u> <u>1 HOUR MACHINE RATE</u>	<u>2.35</u>	<u>1.82</u>	<u>4.17</u>
4.	<u>LIGHT TRACTOR - CAT D4D</u> <u>LOADING CONSTRUCTION</u> <u>2 HOURS MACHINE COST</u>	<u>2 x 1.98</u>	<u>2 x 3.08</u>	<u>10.12</u>
5.				
6.				
Total Machine Rate . . . .		\$	<u>24.56</u>	

B. <u>Wage Rates</u> (Adjusted Hourly Rate)			
	<u>Crew Position/Time</u>	<u>Hour Rate</u>	<u>Total</u>
1.	<u>2 TRACTOR OPERATORS (SMALL) (1 HOUR)</u>	<u>2 x 7.90</u>	<u>15.80</u>
2.	<u>LOADING ENGINEER (1 HOUR)</u>	<u>1 x 9.32</u>	<u>9.32</u>
3.			<u>8</u>

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 25.12

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 49.68 X 10% . . . . . \$ 4.97

D. Total Costs . . . . . \$ 54.65

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>42.5</u>	X	<u>1.080</u>	=	<u>459</u>	
<u>Oil and Gas</u>	<u>7.0</u>	X	<u>2.452</u>	=	<u>172</u>	
<u>Wages</u>	<u>50.5</u>	X	<u>1.074</u>	=	<u>542</u>	
_____		X		=		Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.173</u>	X	\$ <u>54.65</u>
			Schedule 19 Cost	=	\$ <u>64.10</u>	
					\$	_____

III Misc. Add'l Costs/Adjustments

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - Logging Yarding & Loading - Western Oregon  
Operations - Commercial Thinnings - Logging Cost - Wheel Skidder - 1st Loading  
Reference for Cost Table ILLUSTRATION 2 TABLE 37

I Determining Hourly Cost

		<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A.	<u>Machine Rates</u> Machine/Time			
1.	<u>2 Rubber Tired Wheel Skidders -</u> <u>JOHN DEERE 440B</u> <u>4 Hours Fixed Cost.</u>	<u>8 x 1.92</u>		<u>15.36</u>
2.	<u>CATWIP SAW</u> <u>5 Hours Fixed Cost.</u>	<u>5 x .31</u>		<u>1.55</u>
3.	<u>LIGHT MOBILE Loader - Pinner M</u> <u>2 Hours Machine Cost</u>	<u>2 x 2.35</u>	<u>2 x 1.82</u>	<u>8.34</u>
4.	<u>Wheel Skidder w/ Blade - JD-440B</u> <u>Logging Construction</u> <u>3 Hours Machine Rate</u>	<u>3 x 1.92</u>	<u>3 x 3.81</u>	<u>17.19</u>
5.				
6.				
Total Machine Rate . . . . \$				<u>42.44</u>

B.	<u>Wage Rates (Adjusted Hourly Rate)</u> Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1.	<u>2 Tractor Operators (Small) (6 Hours)</u> <u>(SKIDDER)</u>	<u>12 x 7.90</u>	<u>94.80</u>
2.	<u>Logging ENGINEER (2 Hours)</u>	<u>2 x 9.32</u>	<u>18.64</u>
3.			

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 113.44

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 155.88 X 10% . . . . . \$ 15.59

D. Total Costs . . . . . \$ 171.47

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>25.0</u>	X	<u>1.080</u>	=	<u>270</u>	
<u>Oil and Gas</u>	<u>2.2</u>	X	<u>2.452</u>	=	<u>054</u>	
<u>Wages</u>	<u>72.8</u>	X	<u>1.074</u>	=	<u>782</u>	
		X		=		Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.106</u>	X	\$ <u>171.47</u>
						Schedule 19 Cost = \$ <u>189.65</u>
						\$ _____

III Misc. Add'l Costs/Adjustments

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

b. Activity - RIGGING, YARDING & LOADING - WESTERN OREGON  
Operations - COMMERCIAL THINNING - RIGGING COSTS - WHEEL SKIDDER - ADD'L LOADING

Reference for Cost Table ILLUSTRATION 2 TABLE 37

I Determining Hourly Cost

		<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A.	<u>Machine Rates</u> Machine/Time			
1.	<u>2 RUBBER TIED 4 WHEEL SKIDDERS</u> <u>JOHN DEERE 440 B</u> <u>1 HOUR - MACHINE RATE</u>	<u>1.92</u>	<u>3.81</u>	<u>5.73</u>
2.	<u>CAT SAW -</u> <u>1/2 HOUR FIXED COST</u>	<u>5 x .31</u>		<u>.15</u>
3.	<u>LIGHT MOBILE LOADER - PATTER M</u> <u>1 HOUR MACHINE RATE</u>	<u>2.35</u>	<u>1.82</u>	<u>4.17</u>
4.	<u>WHEEL SKIDDER W/ BLADE - JD-440B</u> <u>LOADING CONSTRUCTION</u> <u>3 HOURS MACHINE RATE</u>	<u>3 x 1.92</u>	<u>3 x 3.81</u>	<u>17.19</u>
5.				
6.				
Total Machine Rate . . . . \$				<u>27.24</u>

B.	<u>Wage Rates (Adjusted Hourly Rate)</u> Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1.	<u>2 TRACTOR OPERATORS (Small) (2 1/2 Hours)</u> <u>(SKIDDERS)</u>	<u>2.5 x 7.90</u>	<u>19.75</u>
2.	<u>LOADING ENGINEER - (1 HOUR)</u>	<u>9.32</u>	<u>9.32</u>
3.			

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 29.07

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 56.31 X 10% . . . . . \$ 5.63

D. Total Costs . . . . . \$ 61.94

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>43.9</u>	X	<u>1.080</u>	=	<u>.474</u>	
<u>Oil and Gas</u>	<u>4.5</u>	X	<u>2.452</u>	=	<u>.110</u>	
<u>Wages</u>	<u>51.6</u>	X	<u>1.074</u>	=	<u>.554</u>	
_____	_____	X	_____	=	_____	Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.138</u>	X	\$ <u>61.94</u>
			Schedule 19 Cost	=	\$ <u>70.49</u>	
					\$ _____	

III Misc. Add'l Costs/Adjustments

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

C. Activity - TRANSPORTATION - WESTERN & EASTERN OREGON  
(1) Operations - TRUCK HAULING - OPERATING COST.  
Reference for Cost Table ILLUSTRATION 3 TABLE 1

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>TRUCK - WHITE MODEL 4960</u> <u>W/ FLOOR LESS TRAILER</u> <u>MACHINE RATE</u>	<u>4.15</u>	<u>5.53</u>	<u>9.68</u>
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$			<u>9.68</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1. <u>TRUCK DRIVER</u>	<u>6.34</u>	<u>6.34</u>
2. _____	_____	_____
3. _____	_____	_____

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 6.34

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 16.02 X 10% . . . . . \$ 1.60

D. Total Costs . . . . . \$ 17.62

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>49.3</u>	X	<u>1.080</u>	=	<u>.532</u>	
<u>Oil and Gas</u>	<u>11.1</u>	X	<u>2.452</u>	=	<u>.272</u>	
<u>Wages</u>	<u>39.6</u>	X	<u>1.074</u>	=	<u>.425</u>	
		X		=		Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.229</u>	X	\$ <u>17.62</u>
			Schedule 19 Cost	=	\$	<u>21.65 /hr.</u>
					\$	<u>0.361/min.</u>

III Misc. Add'l Costs/Adjustments

Overtime rate:

Eight hour rate	\$21.65
Overtime differential $\$2.48 \times 1.074 =$	2.66
Additinal general and administrative =	0.27 (10%)
	\$24.58/hr.
	\$00.410/min.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

C. Activity - TRANSPORTATION - WESTON & EPSTON OREGON

(2) Operations - TRUCK HAULING - DELAY COST

Reference for Cost Table ILLUSTRATION 3 TABLE 1

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>TRUCK WHITE MODEL 496 D</u> <u>W/ PEELESS TRAILER</u> <u>FIXED COST / HOUR</u>	<u>4.15</u>		<u>4.15</u>
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$			<u>4.15</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1. <u>TRUCK DRIVER</u>	<u>6.34</u>	<u>6.34</u>
2. _____	_____	_____
3. _____	_____	_____

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4.			
5.			
6.			
7.			
8.			

Total Wage Rate \$ 6.34

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 10.49 X 10% . . . . . \$ 1.05

D. Total Costs . . . . . \$ 11.54

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	39.6	X	1.080	=	.428	
<u>Oil and Gas</u>		X		=		
<u>Wages</u>	60.4	X	1.074	=	.648	
		X		=		Schedule 18 Cost
	100.0%	Weighted Index	=	1.076	X	\$ 11.54
				Schedule 19 Cost	=	\$ 12.42 /hr.
						\$ 0.207/min.

III Misc. Add'l Costs/Adjustments

Overtime rate:

Eight hour rate	\$12.42
Overtime differential - \$2.48 x 1.074 =	2.66
Additional general and administrative costs (10%) =	.27
	\$15.35
	0.256/min.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

d. Activity - ROAD CONSTRUCTION & MAINTENANCE

(1) Operations - EQUIPMENT MOVE IN - (1) BASIC CONSTRUCTION UNIT

Reference for Cost Table ILLUSTRATION 4 TABLE 2

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>TRACTOR MOUNTED DOZER - CAT D8H</u> <u>71300 lbs COMPLETE - 60100 lbs W/O BLADE</u> <u>8 HOURS FIXED COSTS -</u>	<u>8 X 8.71</u>		<u>69.68</u>
2. <u>LOWBOY - FOR HAULING TRACTOR W/O BLADE</u> <u>PUC RATE .19/CWT</u> <u># .19/CWT X 60100 lbs -</u>			<u>126.21</u>
* 3. <u>LOWBOY - FOR HAULING TRACTOR BLADE,</u> <u>COMPRESSOR &amp; TRACK DRILL -</u> <u>PUC RATE .21/CWT X 27800</u>			<u>63.94</u>
4. <u>LOWBOY, EMPTY MILEAGE CHARGE</u> <u>PUC RATE FOR 60 MILES -</u> <u>2 CARRIERS</u>			<u>96.40</u>
5. <u>FLAT CARS - COMMERCIAL RATE</u> <u>70 MILES RT</u> <u>2 CARRIERS</u>			<u>112.60</u>
6. <u>MOTOR GRADER - CAT NO. 12F</u> <u>3 HOURS MACHINE RATE</u>	<u>3 X 2.65</u>	<u>3 X 2.78</u>	<u>16.29</u>
Total Machine Rate . . . . \$			<u>485.12</u>

B. Wage Rates (Adjusted Hourly Rate)  
Crew Position/Time

	<u>Hour Rate</u>	<u>Total</u>
1. <u>TRACTOR DOZER OPR (8 HOURS)</u>	<u>8 X 8.75</u>	<u>70.00</u>
2. <u>CHASSIS (8 HOURS)</u>	<u>8 X 7.67</u>	<u>61.36</u>
3. <u>DRILL OPERATOR (2 HOURS)</u>	<u>2 X 8.30</u>	<u>16.60</u>

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4.	Labor (2 hrs.)	2 x 6.82	13.64
5.	Motor Grader Operator (3 hrs.)	3 x 8.25	24.75
6.			
7.			
8.			
Total Wage Rate		\$	186.35

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 558.87 X 10% . . . . . \$ 55.89

D. Total Costs . . . . . \$ 727.36

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
Equipment	12.50	X	1.080	=	.135	
Oil and Gas	0.01		2.452	=	.025	
Wages	28.20	X	1.074	=	.303	
Transportation	59.29	X	1.229	=	.729	Schedule 18 Cost
100.0% Weighted Index		=	1.192	X	\$	727.36
Schedule 19 Cost =						\$ 867.01
						\$

III Misc. Add'l Costs/Adjustments

\* Machine rate and delay costs not allowed for compressor and track drill  
as rental rate applies to actual operation time (clock time) only.  
Estimated weight of compressor and track drill - 16,600 lbs.  
(complete)



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

d. Activity - Road Construction & Maintenance

Operations - EQUIPMENT MOVE-IN (2) TRACTOR DOZER

Reference for Cost Table ILLUSTRATION 4 TABLE 2

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>TRACTOR MOUNTED DOZER - CAT D8H</u> <u>73100 lbs COMPLETE</u> <u>8 HOURS FIXED COSTS -</u>	<u>8 x 8.71</u>		<u>69.68</u>
2. <u>LOWBOY - FOR HAULING TRACTOR</u> <u>PUC RATE .19/CWT - TWO CARRIERS</u> <u>.19/CWT x 73100 lbs -</u>			<u>153.51</u>
3. <u>LOWBOY - EMPTY CHARGE</u> <u>PUC RATE - 60 MILES</u> <u>2 CARRIERS</u>			<u>96.40</u>
4. <u>FLAG CAR - COMMERCIAL RATE</u> <u>1 CAR FOR CARRIER W/ TRACTOR</u>			<u>56.30</u>
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$			<u>375.89</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1. <u>TRACTOR DOZER OPER - (8 HOURS)</u>	<u>8 x 8.75</u>	<u>70.00</u>
2. <u>CHASER (HELPER) (8 HOURS)</u>	<u>8 x 7.67</u>	<u>61.36</u>
3. _____	_____	_____

(C-2.d-1)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4.	<hr/>	<hr/>	<hr/>
5.	<hr/>	<hr/>	<hr/>
6.	<hr/>	<hr/>	<hr/>
7.	<hr/>	<hr/>	<hr/>
8.	<hr/>	<hr/>	<hr/>

Total Wage Rate                      \$ 131.36

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 507.25                      X 10%                      . . . . . \$ 50.72

D. Total Costs                      . . . . . \$ 557.97

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>13.7</u>	X	<u>1.080</u>	=	<u>.148</u>	
<u>Oil and Gas</u>		X		=		
<u>Wages</u>	<u>25.9</u>	X	<u>1.074</u>	=	<u>.278</u>	
<u>Transportation</u>	<u>60.4</u>	X	<u>1.229</u>	=	<u>.742</u>	Schedule 18 Cost
	100.0%		Weighted Index	=	<u>1.168</u>	X \$ <u>557.97</u>
					Schedule 19 Cost	= \$ <u>651.71</u>
						\$ <u>          </u>

III Misc. Add'l Costs/Adjustments

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9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

d. Activity - ROAD CONSTRUCTION & MAINTENANCE

Operations - EQUIPMENT MOVE IN - (3) AIR COMPRESSOR & TRACK DRILL

Reference for Cost Table ILLUSTRATION 4 TABLE 2

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>AIR COMPRESSOR &amp; TRACK DRILL</u> (BASED ON PENTON RATE 600 CFM COMPRESSOR & 3 1/2" TRACK DRILL)	NO FIXED COST ON PENTON EQUIPMENT -		
2. <u>LOWBOY - FOR HAULING COMPRESSOR</u> <u>&amp; TRACK DRILL - PUC RATE .21/KWT</u> <u>.21/KWT X 16600</u>			38.18
3. <u>LOWBOY - EMPTY MILEAGE CHARGE</u> <u>PUC RATE - 60 MILES -</u>			48.20
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$			86.38

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1. <u>DRILL OPERATOR</u> (2 HOURS)	2 X 8.30	16.60
2. <u>LABOR</u> (2 HOURS)	2 X 6.82	13.64
3. _____	_____	_____

(C-2.d-1)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
 5. \_\_\_\_\_  
 6. \_\_\_\_\_  
 7. \_\_\_\_\_  
 8. \_\_\_\_\_

Total Wage Rate \$ 30.24

C. General and Administrative Costs  
 10% of Machine and Wage Rates

\$ 116.62 X 10% . . . . . \$ 11.66

D. Total Costs . . . . . \$ 128.28

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	_____	X	_____	=	_____	
<u>Oil and Gas</u>	_____	X	_____	=	_____	
<u>Wages</u>	_____	X	_____	=	_____	
<u>Transportation</u>	<u>100</u>	X	<u>1.080</u>	=	<u>1.229</u>	Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.229</u>	X	\$ <u>128.28</u>
						Schedule 19 Cost = \$ <u>157.65</u>
						\$ _____

III Misc. Add'l Costs/Adjustments

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 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

d. Activity - ROAD CONSTRUCTION & MAINTENANCE  
Operations - EQUIPMENT MOVE IN (4.) MOTOR GRADER  
Reference for Cost Table ILLUSTRATION 4 TABLE 2

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> <u>Machine/Time</u>			
1. <u>MOTOR GRADER - CAT 12F</u> <u>3 HOURS MAXIMUM RATE</u>	<u>3 x 2.65</u>	<u>3 x 2.78</u>	<u>16.29</u>
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$ <u>16.29</u>			

B. <u>Wage Rates</u> (Adjusted Hourly Rate) <u>Crew Position/Time</u>	<u>Hour Rate</u>	<u>Total</u>
1. <u>GRADER OPERATOR - (3 hours)</u>	<u>3 x 8.25</u>	<u>24.75</u>
2. _____	_____	_____
3. _____	_____	_____

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 24.75

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 41.04 X 10% . . . . . \$ 4.10

D. Total Costs . . . . . \$ 45.14

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>31.6</u>	X	<u>1.080</u>	=	<u>.341</u>	
<u>Oil and Gas</u>	<u>8.1</u>	X	<u>2.452</u>	=	<u>.199</u>	
<u>Wages</u>	<u>60.3</u>	X	<u>1.074</u>	=	<u>.648</u>	
		X		=		Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.188</u>	X	\$ <u>45.14</u>
				Schedule 19 Cost	=	\$ <u>53.63</u>
						\$ _____

III Misc. Add'l Costs/Adjustments

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

d. Activity - ROAD CONSTRUCTION & MAINTENANCE

Operations - EQUIPMENT MOVE IN (5) WHEEL SCRAPER

Reference for Cost Table ILLUSTRATION 4 TABLE 2

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>Scraper - 12 to 19 cu capacity</u> <u>(Based on Rental Rate)</u> <u>42000 lbs -</u>	<u>NO FIXED COST ON RENTAL EQUIPMENT.</u>		
2. <u>Lowboy - For Hauling Scraper</u> <u>PUC RATE - .19 /CWT</u> <u>.19 /CWT X 42000 lbs -</u>			<u>88.20</u>
3. <u>Lowboy - EMPTY MILEAGE CHARGE</u> <u>PUC RATE 60 MILES</u>			<u>48.20</u>
4. <u>Flag Car - Commercial RATE</u> <u>70 MILES</u>			<u>56.30</u>
5. _____			
6. _____			
Total Machine Rate . . . . \$			<u>192.70</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1. <u>Scraper Operator (21 hours)</u> <u>(Dozer Operator)</u>	<u>2 X 8.92</u>	<u>17.84</u>
2. _____		
3. _____		

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4.	_____	_____	_____
5.	_____	_____	_____
6.	_____	_____	_____
7.	_____	_____	_____
8.	_____	_____	_____

Total Wage Rate \$ 17.84

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 210.54 X 10% . . . . . \$ 21.05

D. Total Costs . . . . . \$ 231.59

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	_____	X	_____	=	_____	
<u>Oil and Gas</u>	_____	X	_____	=	_____	
<u>Wages</u>	<u>08.5</u>	X	<u>1.074</u>	=	<u>.091</u>	
<u>Transportation</u>	<u>91.5</u>	X	<u>1.229</u>	=	<u>1.125</u>	Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.216</u>	X	\$ <u>231.59</u>
				Schedule 19 Cost	=	\$ <u>281.61</u>
						\$ _____

III Misc. Add'l Costs/Adjustments

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

d. Activity - ROAD CONSTRUCTION & MAINTENANCE

Operations - EQUIPMENT MOVE IN (6) 3/4 YARD SHOVEL

Reference for Cost Table ILLUSTRATION 4 TABLE 2

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>SHOVEL - 3/4 YARD CAPACITY</u> <u>(BASED ON RENTAL RATE)</u> <u>47000 LBS -</u>	<u>NO FIXED COST ON RENTAL EQUIPMENT.</u>		
2. <u>LOWBOY - FOR HAULING SHOVEL</u> <u>PUC RATE - .235/CWT</u> <u>.235/CWT X 47000 LBS -</u>			<u>119.85</u>
3. <u>LOWBOY - EMPTY MILEAGE CHARGE</u> <u>PUC RATE - 60 MILES -</u>			<u>48.20</u>
4. <u>TRUCK - COMMERCIAL RATE</u> <u>70 MILES -</u>			<u>56.30</u>
5. _____			
6. _____			
Total Machine Rate . . . . \$			<u>224.35</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1. <u>SHOVEL OPERATOR (2 HOURS)</u>	<u>2 X 8.66</u>	<u>17.32</u>
2. _____		
3. _____		

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 17.32

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 241.67 X 10% . . . . . \$ 24.17

D. Total Costs . . . . . \$ 265.84

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	_____	X	_____	=	_____	
<u>Oil and Gas</u>	_____	X	_____	=	_____	
<u>Wages</u>	7.2	X	1.074	=	.077	
<u>Transportation</u>	92.8	X	1.229	=	1.141	Schedule 18 Cost
	100.0%	Weighted Index	=	1.218	X	\$ <u>265.84</u>
				Schedule 19 Cost	=	\$ <u>323.79</u>
						\$ _____

III Misc. Add'l Costs/Adjustments

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

d. Activity - ROAD CONSTRUCTION & MAINTENANCE

Operations - EQUIPMENT MOVE-IN (7) VIBRATORY ROLLER

Reference for Cost Table ILLUSTRATION 4 TABLE 2

I Determining Hourly Cost

		<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A.	<u>Machine Rates</u> Machine/Time			
* 1.	<u>VIBRATORY ROLLER - 27 to 36 HP</u> <u>(Based on Penton Rate)</u> <u>10,000 lbs.</u>	<u>NO FIXED COST ON</u> <u>PENTON EQUIPMENT.</u>		
2.	<u>LOWBOY FOR HAULING ROLLER</u> <u>PUC RATE -.31/CWT</u> <u>.31/CWT X 10,000 LBS.</u>			<u>34.00</u>
3.	<u>LOWBOY - EMPTY MILEAGE CHARGE</u> <u>PUC - RATE 60</u>			<u>48.20</u>
4.				
5.				
6.				
Total Machine Rate . . . .		\$	<u>82.20</u>	

B.	<u>Wage Rates (Adjusted Hourly Rate)</u> Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1.	<u>Labor (Hauler) (3 hours)</u>	<u>3 x 6.62</u>	<u>19.86</u>
2.			
3.			

(C-2.d-1)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_

5. \_\_\_\_\_

6. \_\_\_\_\_

7. \_\_\_\_\_

8. \_\_\_\_\_

Total Wage Rate                      \$ 19.86

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 102.06 X 10% . . . . . \$ 10.21

D. Total Costs . . . . . \$ 112.27

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	_____	X	_____	=	_____	
<u>Oil and Gas</u>	_____	X	_____	=	_____	
<u>Wages</u>	19.5	X	1.074	=	.209	
<u>Transportation</u>	80.5	X	1.229	=	.989	Schedule 18 Cost
					100.0% Weighted Index =	1.198 X \$ <u>112.27</u>
					Schedule 19 Cost =	\$ <u>134.50</u>
						\$ _____

III Misc. Add'l Costs/Adjustments

\* Roller to be pulled by tractor or other equipment already on job.

If such equipment not available - allow appropriate move-in.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

d. Activity - ROAD CONSTRUCTION & MAINTENANCE  
Operations - EQUIPMENT MOVE-IN (8) GRID ROLLER  
Reference for Cost Table ILLUSTRATION 4 TABLE 2

I Determining Hourly Cost

		<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A.	<u>Machine Rates</u> Machine/Time			
		NO FIXED COSTS ON RENTAL EQUIPMENT.		
* 1.	<u>Grid Roller - 16 TON</u> <u>(BASED ON RENTAL RATE)</u> <u>32000 lbs.</u>			
2.	<u>LOWBOY - FOR HAULING ROLLER</u> <u>PUC RATE - .31 /CWT</u> <u>.31/CWT X 32000 lbs.</u>			<u>105.60</u>
3.	<u>LOWBOY - EMPTY RAILROAD CHARGE</u> <u>PUC RATE - 60 MILES -</u>			<u>48.20</u>
4.				
5.				
6.				
Total Machine Rate . . . . \$			<u>153.80</u>	

B.	<u>Wage Rates (Adjusted Hourly Rate)</u> Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1.	<u>LABOR (Harper)</u> (31 hours)	<u>3 X 6.62</u>	<u>19.86</u>
2.			
3.			

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 19.86

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 173.66 X 10% . . . . . \$ 17.37

D. Total Costs . . . . . \$ 191.03

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	_____	X	_____	=	_____	
<u>Oil and Gas</u>	88.6	X	1.229	=	1.089	
<u>Wages</u>	11.4	X	1.074	=	.122	
_____	_____	X	_____	=	_____	Schedule 18 Cost
	100.0%	Weighted Index	=	1.211	X	\$ 191.03
				Schedule 19 Cost	=	\$ 231.34
						\$ _____

III Misc. Add'l Costs/Adjustments

\* Roller to be pulled by tractor or other equipment already on job.

If such equipment not available, allow appropriate move-in.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

d. Activity - ROAD CONSTRUCTION & MAINTENANCE

Operations - EQUIPMENT MOVE IN (9) DUMP TRUCK

Reference for Cost Table ILLUSTRATION 4 TABLE 2

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
* 1. <u>Dump Truck - Normal Duty -</u> <u>8 to 12 cu capacity</u> <u>(Based on Rental Rate)</u>	<u>2x 13.51 (Rental)</u>		<u>27.02</u>
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$			<u>27.02</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1. <u>Dump Truck Oper -</u> (21 hours)	<u>2x 7.72</u>	<u>15.44</u>
2. _____	_____	_____
3. _____	_____	_____

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 15.44

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 42.46 X 10% . . . . . \$ 4.25

D. Total Costs . . . . . \$ 46.71

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>51.9</u>	X	<u>1.132</u>	=	<u>.588</u>	
<u>Oil and Gas</u>	<u>11.7</u>	X	<u>2.515</u>	=	<u>.294</u>	
<u>Wages</u>	<u>36.4</u>	X	<u>1.074</u>	=	<u>.391</u>	
		X		=		Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.273</u>	X	\$ <u>46.71</u>
				Schedule 19 Cost	=	\$ <u>59.46</u>
						\$ _____

III Misc. Add'l Costs/Adjustments

\* Move in based on operator driving truck to job - Rental rates include  
all costs such as license fee, etc.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

d. Activity - ROAD CONSTRUCTION & MAINTENANCE  
Operations - EQUIPMENT MOVE IN (10) LIGHT (MISC) TRACTOR  
Reference for Cost Table ILLUSTRATION 4 TABLE 2

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>LIGHT CREWLER TRACTOR - CAT D40</u> <u>2 Hour DUMP.</u> <u>30000 lbs -</u>	<u>2 x 1.98</u>		<u>3.96</u>
2. <u>LOWBOY - ETC HAULING TRACTOR</u> <u>PUC RATE - .21 / CWT</u> <u>.21 / CWT x 30000 lbs -</u>			<u>69.00</u>
3. <u>LOWBOY - EMPTY MILEAGE CHARGE</u> <u>PUC RATE - 60 MILES -</u>			<u>48.20</u>
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$			<u>121.16</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1. <u>TRACTOR OPER (SMALL)</u> (2 hours)	<u>2 x 7.90</u>	<u>15.80</u>
2. _____	_____	_____
3. _____	_____	_____

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 15.80

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 136.96 X 10% . . . . . \$ 13.69

D. Total Costs . . . . . \$ 150.65

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>02.9</u>	X	<u>1.080</u>	=	<u>.031</u>	
<u>Oil and Gas</u>	<u>85.6</u>	X	<u>1.229</u>	=	<u>1.052</u>	
<u>Wages</u>	<u>11.5</u>	X	<u>1.074</u>	=	<u>.124</u>	
_____		X		=		Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.207</u>	X	\$ <u>150.65</u>
				Schedule 19 Cost	=	\$ <u>181.83</u>
						\$ _____

III Misc. Add'l Costs/Adjustments

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



9333.3 - PRODUCTION COSTS

(Schedule 19)

Operating Cost Computations

d. Activity - ROAD CONSTRUCTION & MAINTENANCE

Operations - EQUIPMENT MOVE-IN (11) FRONT END (BUCKET) LOADER

Reference for Cost Table ILLUSTRATION 4 TABLE 2

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>FRONT END LOADER - CAT 950</u> <u>2 to 2 1/2 CU CAPACITY</u> <u>3 HOURS MACHINE RATE</u>	<u>3 x 3.73</u>	<u>3 x 4.04</u>	<u>23.31</u>
2. <u>ON HIGHWAY TRIP PERMIT</u> <u>DMU.</u>			<u>5.00</u>
3.			
4.			
5.			
6.			

Total Machine Rate . . . . \$ 28.31

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1. <u>TRACTOR OPER (LARGE) (3 HOURS)</u>	<u>3 x 8.75</u>	<u>26.25</u>
2.		
3.		

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 26.25

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 54.56 X 10% . . . . . \$ 5.46

D. Total Costs . . . . . \$ 60.02

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>36.3</u>	X	<u>1.080</u>	=	<u>.392</u>	
<u>Oil and Gas</u>	<u>6.4</u>	X	<u>2.452</u>	=	<u>.157</u>	
<u>Wages</u>	<u>48.1</u>	X	<u>1.074</u>	=	<u>.517</u>	
<u>Transportation</u>	<u>9.2</u>	X	<u>1.229</u>	=	<u>.113</u>	Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.179</u>	X	\$ <u>60.02</u>
				Schedule 19 Cost	=	\$ <u>70.76</u>
						\$ _____

III Misc. Add'l Costs/Adjustments

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

d. Activity - ROAD CONSTRUCTION & MAINTENANCE  
(2) Operations - CLEANING - PER ACRE  
Reference for Cost Table ILLUSTRATION 4 TABLE 3

I Determining Hourly Cost

		Fixed	Operating	Total
A.	<u>Machine Rates</u> Machine/Time			
1.	<u>GRADING TRACTOR - CAT D7F</u> <u>MACHINE RATE - 10.45 HOURS -</u> <u>Fixed Costs (Owner) 2.50 HOURS -</u>	<u>12.95</u> <u>+ 6.24</u>	<u>10.45</u> <u>+ 1.32</u>	<u>157.30</u>
2.				
3.				
4.				
5.				
6.				
Total Machine Rate . . . .		\$	<u>157.30</u>	

B.	<u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
<u>CLEANING -</u>	1. <u>TRACTOR OPER (LARGE) (10.45 Hrs)</u>	<u>10.45 + 8.75</u>	<u>91.44</u>
<u>MANUAL</u>	2. <u>TRACTOR OPER (LARGE) (1.98 Hrs)</u>	<u>1.98 + 8.75</u>	<u>17.33</u>
<u>LABOR</u>	3. <u>OWNER</u> (10.58 Hrs)	<u>10.58 + 7.67</u>	<u>81.15</u>

(C-2, d-2)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4.	_____	_____	_____
5.	_____	_____	_____
6.	_____	_____	_____
7.	_____	_____	_____
8.	_____	_____	_____

Total Wage Rate \$ 189.92C. General and Administrative Costs  
10% of Machine and Wage Rates\$ 347.22 X 10% . . . . . \$ 34.72D. Total Costs . . . . . \$ 381.94II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>40.2</u>	X	<u>1.080</u>	=	<u>.434</u>	
<u>Oil and Gas</u>	<u>5.1</u>	X	<u>2.452</u>	=	<u>.125</u>	
<u>Wages</u>	<u>54.7</u>	X	<u>1.074</u>	=	<u>.588</u>	
		X		=		Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.147</u>	X	\$ <u>381.94</u>
				Schedule 19 Cost	=	\$ <u>438.09</u>
						\$ _____

III Misc. Add'l Costs/AdjustmentsTime per Acre (from Studies) -Tractor - D7F working time - 627 minutes 10.45 hoursTractor - D7F fixed (delay) time - 150 minutes 2.50 hours

<u>Manual Labor -</u>	<u>Chaser Time</u>	<u>635 minutes - 10.58 hrs.</u>
	<u>Tractor Operator Time</u>	<u>119 minutes - 1.98 hrs.</u>



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

d. Activity - Road Construction & MAINTENANCE

(3) Operations - EXCAVATION & END HAUL W/ WHEEL SCRAPER

Reference for Cost Table ILLUSTRATION 4 TABLE 10

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>Scraper - Rental Rate For</u> <u>2 Wheel Scraper - 12 to 19 cy -</u>			<u>32.78</u>
2. <u>Tractor Mounted Dozer - D 814</u>	<u>8.71</u>	<u>9.57</u>	<u>18.28</u>
3.			
4.			
5.			
6.			

Total Machine Rate . . . . \$ 51.06

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1. <u>Wheel Scraper op.</u> <u>(Dozer op.)</u>	<u>8.75</u>	<u>8.75</u>
2. <u>Dozer operator</u>	<u>8.75</u>	<u>8.75</u>
3.		

(C-2, d-3)

9333.3 - PRODUCTION COSTS  
(Schedule 19)Updating Costs

	Schedule 18 Operating Cost in %	<u>D8H Fixed</u> X	Increase Factor	=	Current Index
Equipment	_____	X	_____	=	1.08
Oil and Gas	_____	X	_____	=	_____
Wages	_____	X	_____	=	_____

Schedule 18  
Cost

$$100.0\% \text{ Weighted Index} = \frac{1.08}{\text{Schedule 19 Cost}} \times \$ 8.71 = \$ \underline{\underline{9.41/\text{hr.}}}$$

		<u>D8H Operating</u>			
Equipment	69.0	X	1.080	=	.745
Oil and Gas	31.0	X	2.452	=	.760
Wages	_____	X	_____	=	_____

Schedule 18  
Cost

$$100.0\% \text{ Weighted Index} = \frac{1.505}{\text{Schedule 19 Cost}} \times \$ 9.57 = \$ \underline{\underline{14.40/\text{hr.}}}$$

$$\$ \underline{\underline{.240/\text{min.}}}$$

		<u>Wheel Scraper</u>			
Equipment	.856	X	1.132	=	.969
Oil and Gas	.144	X	2.515	=	.362
Wages	_____	X	_____	=	_____

Schedule 18  
Cost

$$100.0\% \text{ Weighted Index} = \frac{1.331}{\text{Schedule 19 Cost}} \times \$ 32.78 = \$ \underline{\underline{43.63}}$$

$$\$ \underline{\underline{\hspace{1cm}}}$$

Misc. Add'l Costs/Adjustments  
See Page 275BLM Manual Supplement  
State Office - OregonRelease 9-113  
5/1/74  
120



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

d. Activity - ROAD CONSTRUCTION & MAINTENANCE  
(4) Operations - EXCAVATION WITH 3/4 C.Y. SHOVEL

Reference for Cost Table ILLUSTRATION 4 TABLE 11

I Determining Hourly Cost

		<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A.	<u>Machine Rates</u> Machine/Time			
1.	<u>3/4 C.Y. SHOVEL - RENTAL RATE (22.83)</u> <u>* 53% EFFICIENCY -</u>	<u>.53 x</u>	<u>\$ 22.83</u>	<u>12.10</u>
2.				
3.				
4.				
5.				
6.				
Total Machine Rate . . . .		\$	<u>12.10</u>	

B.	<u>Wage Rates (Adjusted Hourly Rate)</u> Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1.	<u>SHOVEL OPERATOR</u>	<u>8.66</u>	<u>8.66</u>
2.	<u>LABOR (Helper)</u>	<u>6.82</u>	<u>6.82</u>
3.			

(C-2. d-4)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
 5. \_\_\_\_\_  
 6. \_\_\_\_\_  
 7. \_\_\_\_\_  
 8. \_\_\_\_\_

Total Wage Rate \$ 15.48

C. General and Administrative Costs  
 10% of Machine and Wage Rates

\$ 27.58 X 10% . . . . . \$ 2.76

D. Total Costs . . . . . \$ 30.34

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>37.8</u>	X	<u>1.132</u>	=	<u>.428</u>	
<u>Oil and Gas</u>	<u>6.2</u>	X	<u>2.515</u>	=	<u>.156</u>	
<u>Wages</u>	<u>56.0</u>	X	<u>1.074</u>	=	<u>.601</u>	
		X		=		Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.185</u>	X	\$ <u>30.34</u>
						Schedule 19 Cost = \$ <u>35.95</u>
						\$ _____

III Misc. Add'l Costs/Adjustments

\* Adjustment - Machine rate for operating efficiency

Actual operating at 53% of total available working time

(from data based on FHA (BPR) time studies.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

d. Activity - ROAD CONSTRUCTION & MAINTENANCE  
(5) Operations - SHOVEL LOADING - BANK TO TRUCK

Reference for Cost Table ILLUSTRATION 4 TABLE 12

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>3/4 CU. SHOVEL - RENTAL RATE (22.83)</u>	<u>.53</u>	<u>22.83</u>	<u>12.10</u>
<u>X 53% EFFICIENCY =</u>			
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____

Total Machine Rate . . . . \$ 12.10

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1. <u>SHOVEL OPERATOR</u>	<u>8.66</u>	<u>8.66</u>
2. <u>LABORER (HELPER)</u>	<u>6.82</u>	<u>6.82</u>
3. _____	_____	_____

(C-2, d-5)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4.			
5.			
6.			
7.			
8.			

Total Wage Rate \$ 15.48

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 27.58 X 10% . . . . . \$ 2.76

D. Total Costs . . . . . \$ 30.34II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	37.8	X	1.132	=	.428	
<u>Oil and Gas</u>	6.2	X	2.515	=	.156	
<u>Wages</u>	56.0	X	1.074	=	.601	
		X		=		Schedule 18 Cost
	100.0%	Weighted Index	=	1.185	X	\$ 30.34
				Schedule 19 Cost	=	\$ 35.95
						\$ 0.43/cu. yd.

III Misc. Add'l Costs/Adjustments

\* Machine rate for 53% efficient. Hourly production @ 53% off. Adjusted for swell from bank cubic yards (in place) to loose cubic yards, loaded in truck.

Bank CY/hour ÷ load factor 50 CY/hour ÷ .60 = 83 CY/hour

\$30.34 x 1.185 = \$35.95 83 CY/hour = \$0.43/cu. yd.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

d. Activity - Road Construction & Maintenance  
(6) Operations - Grading - Per Station

Reference for Cost Table Illustration 4 Table 18

I Determining Hourly Cost

		<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A.	<u>Machine Rates</u>			
	Machine/Time			
*1.	<u>MOTOR GRADER - CAT NO 12F</u>	<u>20.4</u>	<u>11.8 + .043</u>	<u>1.41</u>
	<u>OPERATING &amp; IDLING TIME - 20.4 MIN.</u>			
	<u>OPERATING TIME 11.8 MIN.</u>			
2.				
3.				
4.				
5.				
6.				
Total Machine Rate . . . .		\$	<u>1.41</u>	

B.	<u>Wage Rates (Adjusted Hourly Rate)</u>	<u>MIN.</u>	
	Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
*1.	<u>Grader Operator (20.4 MIN.)</u>	<u>20.4 x .139</u>	<u>2.84</u>
2.			
3.			

(C-2, d-6)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
 5. \_\_\_\_\_  
 6. \_\_\_\_\_  
 7. \_\_\_\_\_  
 8. \_\_\_\_\_

Total Wage Rate \$ 2.84

C. General and Administrative Costs  
 10% of Machine and Wage Rates

\$ 4.25 X 10% . . . . . \$ .42

D. Total Costs . . . . . \$ 4.67

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>28.2</u>	X	<u>1.080</u>	=	<u>.305</u>	
<u>Oil and Gas</u>	<u>5.0</u>	X	<u>2.452</u>	=	<u>.123</u>	
<u>Wages</u>	<u>66.8</u>	X	<u>1.074</u>	=	<u>.717</u>	
		X		=		Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.145</u>	X	\$ <u>4.67</u>
						Schedule 19 Cost = \$ <u>5.35/station</u>
						\$ _____

III Misc. Add'l Costs/Adjustments

\* Study time per station (minutes) - Based on six BLM time studies -

Operating 1559 minutes/131.86 stations = 11.8 min./sta.

Delay 1129 minutes/131.86 stations = 8.6 min./sta.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

## Operating Cost Computations

d. Activity - Road Construction & Maintenance  
(7) Operations SURFACING - LOADING (from STOCKPILE)

Reference for Cost Table ILLUSTRATION 4- TABLE 19

## I Determining Hourly Cost

		<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A.	<u>Machine Rates</u>			
	Machine/Time			
1.	<u>FRONT END - (Bucket) Loader</u> <u>CA 7 950</u> <u>2 to 2 1/2 cu cap.</u>	<u>3.73</u>	<u>4.04</u>	<u>7.77</u>
2.				
3.				
4.				
5.				
6.				
Total Machine Rate . . .		\$	<u>7.77</u>	

B.	<u>Wage Rates (Adjusted Hourly Rate)</u>		
	Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1.	<u>TRACTOR (Loader) Operator</u>	<u>7.90</u>	<u>7.90</u>
2.			
3.			

(C-2,d-7)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4.	_____	_____	_____
5.	_____	_____	_____
6.	_____	_____	_____
7.	_____	_____	_____
8.	_____	_____	_____

Total Wage Rate \$ 7.90C. General and Administrative Costs  
10% of Machine and Wage Rates\$ 15.67 X 10% . . . . . \$ 1.57D. Total Costs . . . . . \$ 17.24II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>42.2</u>	X	<u>1.080</u>	=	<u>.456</u>	
<u>Oil and Gas</u>	<u>7.4</u>	X	<u>2.452</u>	=	<u>.181</u>	
<u>Wages</u>	<u>50.4</u>	X	<u>1.074</u>	=	<u>.541</u>	
_____	_____	X	_____	=	_____	Schedule 18 Cost
100,0% Weighted Index =					<u>1.178</u>	X \$ <u>17.24</u>
					Schedule 19 Cost =	\$ <u>20.31/hr.</u>
						\$ <u>0.20/cu. yd.</u>

III Misc. Add'l Costs/AdjustmentsAdjustment to cost per cubic yardEstimated hourly production 100 c.y.\$20.31/100 = \$0.20/cu. yd.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

d. Activity - ROM CONSTRUCTION & MAINTENANCE  
(8) Operations - SPREADING - COST PER STATION  
Reference for Cost Table ILLUSTRATION 4 TABLE 19

I Determining Hourly Cost

		<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A.	<u>Machine Rates</u> Machine/Time			
1.	<u>MOTOR GRADER - COST NO 12F.</u>	<u>4.24</u>	<u>3.18</u>	<u>.326</u>
*	<u>OPERATING + DEMO - 4.24 MINUTES.</u>	<u>.043</u>	<u>.045</u>	
*	<u>OPERATING - 318 MINUTES</u>			
2.				
3.				
4.				
5.				
6.				
Total Machine Rate . . . .		\$ <u>.326</u>		

B.	<u>Wage Rates</u> (Adjusted Hourly Rate)	<u>MIN.</u>	
	Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
* 1.	<u>Genie Operator (4.24 MIN)</u>	<u>4.24 + .138</u>	<u>.585</u>
2.			
3.			

(C-2,d.8)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4.	_____	_____	_____
5.	_____	_____	_____
6.	_____	_____	_____
7.	_____	_____	_____
8.	_____	_____	_____
Total Wage Rate		\$	<u>.585</u>

C. General and Administrative Costs  
10% of Machine and Wage Rates\$ .911 X 10% . . . . . \$ .09D. Total Costs . . . . . \$ 1.00II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>29.5</u>	X	<u>1.080</u>	=	<u>.319</u>	
<u>Oil and Gas</u>	<u>6.3</u>	X	<u>2.452</u>	=	<u>.154</u>	
<u>Wages</u>	<u>64.2</u>	X	<u>1.074</u>	=	<u>.689</u>	
		X		=		Schedule 18 Cost
	100.0%	Weighted Index	<u>1.162</u>	X	\$ <u>1.00</u>	
			Schedule 19 Cost	=	\$ <u>1.16/station</u>	
					\$ _____	

III Misc. Add'l Costs/Adjustments

\* Study time per station (minutes)

Motor grader - estimated 7 passes @ 2.5 miles per hour for each  
100' lift of aggregate, or 700 linear feet of grader spreading for each  
100' station

- Total time - operating was estimated at 75% of total spreading time

2.5 MPH = 220'/min. - 700'/220'/min. = 3.18 min./station

3.18 min./sta. ÷ 75% = 4.24 min. total time per station



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

d. Activity - ROAD CONSTRUCTION & MAINTENANCE  
(9) Operations - ROLLING ROCK - VIBRATORY ROLLER W/CAT D6C

Reference for Cost Table ILLUSTRATION 4 TABLE 19

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>Vibratory Roller - 27 to 36 HP</u> <u>Based on Penetration Rate</u>			<u>10.58</u>
2. <u>Towing Tractor - CAT D6C</u> <u>Maximum Rate</u>	<u>5.38</u>	<u>4.00</u>	<u>9.38</u>
3.			
4.			
5.			
6.			
Total Machine Rate . . . . \$			<u>19.96</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1. <u>Tractor Op. (Small)</u>	<u>7.90</u>	<u>7.90</u>
2.		
3.		

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 7.90

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 27.86 X 10% . . . . . \$ 2.79

D. Total Costs . . . . . \$ 30.65

II Updating Costs

		Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	1971	33.8		1.132	=	.383	
		<u>30.1</u>	X	<u>1.080</u>	=	<u>.325</u>	
<u>Oil and Gas</u>		4.1		2.452	=	.101	
		<u>3.6</u>	X	<u>2.515</u>	=	<u>.090</u>	
<u>Wages</u>		28.4		1.074	=	.305	
			X		=		
							Schedule 18 Cost
		100.0%	Weighted Index	=	1.204	X	\$ 30.65
							Schedule 19 Cost = \$ 36.90
							\$

III Misc. Add'l Costs/Adjustments

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



9333.3 - PRODUCTION COSTS

(Schedule 19)

Operating Cost Computations

d. Activity - Pond Construction & Maintenance  
Operations - Rolling Box - Vibratory Roller w/ Rubber Tire Tread -  
Reference for Cost Table ILLUSTRATION 4 TABLE 19

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> <u>Machine/Time</u>			
1. <u>Vibratory Roller - 27 to 36 HP</u> <u>(Based on Rental Rate)</u>			<u>10.58</u>
2. <u>Rolling Tread - Rubber Tires</u> <u>Formal - Cat 950</u> <u>MACHINE RATE</u>			<u>7.77</u>
3. _____			
4. _____			
5. _____			
6. _____			
Total Machine Rate . . . . \$			<u>18.35</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate) <u>Crew Position/Time</u>	<u>Hour Rate</u>	<u>Total</u>
1. <u>Tractor Op. (Small)</u>	<u>7.90</u>	<u>7.90</u>
2. _____		
3. _____		

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 7.00

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 26.25 X 10% . . . . . \$ 2.63

D. Total Costs . . . . . \$ 28.88

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
Equipment 1971	.346	X	1.132	=	.392	
Equipment 1972	.252	X	1.080	=	.272	
Oil and Gas 1971	.057		2.515		.143	
Oil and Gas 1972	.044	X	2.452	=	.108	
Wages	.301	X	1.074	=	.323	
		X		=		Schedule 18 Cost
	100.0%	Weighted Index	1.238	X	\$	28.88
			Schedule 19 Cost	=	\$	35.75 /hr.
					\$	0.596/min

III Misc. Add'l Costs/Adjustments

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

d. Activity - Camp Construction & Maintenance  
Operations - Rolling Rock - Grid Roller w/ Tractor D6C  
Reference for Cost Table Illustration 4 Table 19

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>Grid Roller - 16 Ton</u> <u>(Based on Hourly Rate)</u>			<u>8.97</u>
2. <u>Towing Tractor - CAT D6C</u> <u>MACHINE RATE</u>	<u>5.38</u>	<u>4.00</u>	<u>9.38</u>
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$			<u>18.35</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1. <u>Tractor Op (Small)</u>	<u>7.90</u>	<u>7.90</u>
2. _____	_____	_____
3. _____	_____	_____

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ 7.90

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ 26.25 X 10% . . . . . \$ 2.62

D. Total Costs . . . . . \$ 28.87

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>31.8</u>	X	<u>1.080</u>	=	<u>.343</u>	
<u>Oil and Gas</u>	<u>3.9</u>	X	<u>2.452</u>	=	<u>.096</u>	
<u>Wages</u>	<u>30.1</u>	X	<u>1.074</u>	=	<u>.323</u>	
		X		=		Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.149</u>	X	\$ <u>28.87</u>
				Schedule 19 Cost	=	\$ <u>33.17 /hr.</u>
						\$ <u>0.553/min.</u>

III Misc. Add'l Costs/Adjustments

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

e. Activity - FIRE PROTECTION & HAZARD REDUCTION

(1) Operations - FIRE PROTECTION - PORTABLE PUMP

Reference for Cost Table ILLUSTRATION 5 TABLE 1

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> <u>Machine/Time</u>			
1. <u>PORTABLE PUMP - W/ MOTOR</u> <u>EDWARDS MFG. CO MODEL TS-25</u>			<u>580.50</u>
2. <u>500' OF 1" HOSE</u> <u>@ 54.00 / 100'</u>			<u>283.50</u>
3. <u>NOZZLE - EDWARDS STOP-O-</u> <u>MATIC - (15 TO 45 lbs RANGE)</u>			<u>26.00</u>
4. <u>1 1/2' X 10' SUCTION HOSE &amp;</u> <u>STRAINER</u>			<u>41.50</u>
5. _____			
6. _____			
Total Machine <sup>Cost</sup> Rate . . . . \$			<u>931.50</u>

B. Wage Rates (Adjusted Hourly Rate)  
Crew Position/Time

	<u>Hour Rate</u>	<u>Total</u>
1. _____		
2. _____		
3. _____		

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ \_\_\_\_\_

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ \_\_\_\_\_ X 10% . . . . . \$ \_\_\_\_\_

D. Total Costs . . . . . \$ 931.50

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>1.00</u>	X	<u>1.080</u>	=	<u>1.080</u>	
<u>Oil and Gas</u>	_____	X	_____	=	_____	
<u>Wages</u>	_____	X	_____	=	_____	
_____	_____	X	_____	=	_____	Schedule 18 Cost
100.0% Weighted Index = <u>1.080</u>						X \$ <u>931.50</u>
Schedule 19 Cost =						\$ <u>1,006.02</u>
						\$ <u>1.34/day</u>

III Misc. Add'l Costs/Adjustments

Equipment used 5 mos. @ 30 days/month = 150 days

Depreciation period - 5 years - \$1,006.02/5 years = \$201.20/yr.

Cost/day \$201.20/yr. /150 days = \$1.34



9333.3 - PRODUCTION COSTS

(Schedule 19)

Operating Cost Computations

e, Activity - FIRE PROTECTION & HAZARD REDUCTION

Operations - FIRE PROTECTION - TRAILER MOUNTED PUMP

Reference for Cost Table ILLUSTRATION 5 TABLE 1

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> <u>Machine/Time</u>			
1. <u>TRAILER-UNIT.</u>			<u>577.50</u>
2. <u>PUMP - EDWARDS MFG. CO - MODEL</u> <u>ST-500 - 500 GAL TANK W/ RELIEF</u> <u>VALVE, SUCTION HOSE, STRAINER</u> <u>&amp; HOSE REEL</u>			<u>1846.00</u>
3. _____			
4. <u>500' OF 1" HOSE</u> <u>@ 54.00 / 100'</u>			<u>283.50</u>
5. <u>FOG NOZZLE W/ AUTO SHUT</u> <u>OFF.</u>			<u>52.50</u>
6. _____			
Total Machine <sup>Cost</sup> Rate . . . . \$			<u>2759.50</u>

B. Wage Rates (Adjusted Hourly Rate)  
Crew Position/Time

	<u>Hour Rate</u>	<u>Total</u>
1. _____		
2. _____		
3. _____		

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ \_\_\_\_\_

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ \_\_\_\_\_ X 10% . . . . . \$ \_\_\_\_\_

D. Total Costs . . . . . \$ 2,759.50

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>1.00%</u>	X	<u>1.080</u>	=	<u>1.080</u>	
<u>Oil and Gas</u>	_____	X	_____	=	_____	
<u>Wages</u>	_____	X	_____	=	_____	
_____	_____	X	_____	=	_____	Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.080</u>	X	\$ <u>\$2,759.50</u>
				Schedule 19 Cost	=	\$ <u>\$2,980.26</u>
						\$ <u>3.97/day</u>

III Misc. Add'l Costs/Adjustments

Equipment used 5 months @ 30 days/month = 150 days

Depreciation period - 5 years - \$2,980.26/5 yrs = \$596.05/yr

Cost/day = \$596.05/150 days = \$3.97



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

C, Activity - FIRE PROTECTION & HAZARD REDUCTION

Operations - FIRE PROTECTION - TRUCK MOUNTED PUMP

Reference for Cost Table ILLUSTRATION 5 TABLE 1

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> <u>Machine/Time</u>			
1. <u>USED 1 1/2 TON FLAT BED TRUCK -</u>			<u>787.50</u>
2. <u>SLID ON UNIT - EDWARDS Mfg. Co</u> <u>MODEL ST-500 - 500 GAL TANK</u> <u>W/ RELIEF VALVE SECTION HOSE,</u> <u>STRAINER &amp; HOSE REEL -</u>			<u>1846.00</u>
3. _____			
4. <u>500' OF 1" HOSE</u> <u>@ \$54.00/100'</u>			<u>283.50</u>
5. <u>FOG NOZZLE W/ SHUT OFF.</u> <u>(AUTO).</u>			<u>52.50</u>
6. _____			
Total Machine <sup>Cost</sup> Rate . . . . \$			<u>2969.50</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate) <u>Crew Position/Time</u>	<u>Hour Rate</u>	<u>Total</u>
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
5. \_\_\_\_\_  
6. \_\_\_\_\_  
7. \_\_\_\_\_  
8. \_\_\_\_\_

Total Wage Rate \$ \_\_\_\_\_

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ \_\_\_\_\_ X 10% . . . . . \$ \_\_\_\_\_

D. Total Costs . . . . . \$ 2,969.50

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>1.00</u>	X	<u>1.080</u>	=	<u>1.080</u>	
<u>Oil and Gas</u>	_____	X	_____	=	_____	
<u>Wages</u>	_____	X	_____	=	_____	
_____	_____	X	_____	=	_____	Schedule 18 Cost
	100.0%	Weighted Index	=	<u>1.080</u>	X	\$ <u>2,969.50</u>
				Schedule 19 Cost	=	\$ <u>3,207.06</u>
						\$ <u>4/28/day</u>

III Misc. Add'l Costs/Adjustments

Equipment used - 5 months @ 30 days per month = 150 days  
Depreciation period - 5 years - \$3,207.06/5 years = \$641.41/vr  
Cost/day \$641.41/150 days = \$4.28/day



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

e. Activity - FIRE PROTECTION & HAZARD REDUCTION  
Operations - FIRE PROTECTION - ASSOCIATED FIRE EQUIPMENT  
Reference for Cost Table ILLUSTRATION 5 TABLE 1

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> <u>Machine/Time</u>			
1. <u>HYDROMETER</u>			<u>16.00</u>
2. <u>4 HAZEL HOS @ 12.50 / FOOT</u> <u>3 FIRE AXES @ 8.00 / FOOT</u> <u>3 SHOVELS @ 7.50 / FOOT</u>			<u>101.00</u>
3. <u>4 BACK PUMPS @ 35.00 / FOOT</u>			<u>147.00</u>
4. <u>10 HAND LIGHTS (FOR MEN)</u> <u>@ 7.00 / FOOT</u>			<u>73.50</u>
5. <u>2 SET TRAXOR HAND LIGHTS -</u> <u>@ 250.00 / SET</u>			<u>525.00</u>
6. <u>METAL FIRE BAR - 12" X 12" X 5'</u> <u>W/ LOCK</u>			<u>105.00</u>
Total Machine <sup>COST</sup> Rate . . . . \$ <u>967.50</u>			

B. <u>Wage Rates</u> (Adjusted Hourly Rate) <u>Crew Position/Time</u>	<u>Hour Rate</u>	<u>Total</u>
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____

(C-2.e-1)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_

5. \_\_\_\_\_

6. \_\_\_\_\_

7. \_\_\_\_\_

8. \_\_\_\_\_

Total Wage Rate                      \$ \_\_\_\_\_

C. General and Administrative Costs  
10% of Machine and Wage Rates

\$ \_\_\_\_\_ X 10% . . . . . \$ \_\_\_\_\_

D. Total Costs . . . . . \$ 967.50

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	1.00	X	1.080	=	1.080	
<u>Oil and Gas</u>		X		=		
<u>Wages</u>		X		=		
		X		=		Schedule 18 Cost
					100.0% Weighted Index =	1.080 X \$ <u>967.50</u>
					Schedule 19 Cost =	\$ <u>1,044.90</u>
						\$ <u>1.39/day</u>

III Misc. Add'l Costs/Adjustments

Equipment used 5 months @ 30 days/month = 150 days

Depreciation period 5 years - \$1,044.90/5 yrs = \$208.98/yr.

Cost/day \$208.98/150 days = \$1.39/day



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

e. Activity - FIRE PROTECTION & HAZARD REMEDIATION  
(2) Operations - FIRE PROTECTION - PORTABLE PUMP - COST BY SIZE

Reference for Cost Table ILLUSTRATION 5 TABLE 1

I Determining Hourly Cost

		<u>Fixed</u>	<u>Operating</u>	<u>Total</u> <u>Dmg.</u>
A.	<u>Machine Rates</u> Machine/Time			
1.	<u>PORTABLE PUMP - ETC</u>			<u>1.24</u>
2.	<u>ASSOC. FIRE EQUIPMENT</u>			<u>1.29</u>
3.				
4.				
5.				
6.				
Total Machine Rate . . . .		\$	<u>2.53</u>	

B.	<u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Dmg</u> <u>Hour Rate</u>	<u>Total</u>
1.	<u>LABORER (1 Hour/Day)</u>	<u>6.82</u>	<u>6.82</u>
2.			
3.			

(C-2, e-2)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

Total Wage Rate

\$ 6.82/day

## II Updating Costs

Wages	\$6.82	x	1.074	= \$7.32/day
-------	--------	---	-------	--------------

Equipment - Portable pump (Pg. 229)	1.34/day
-------------------------------------	----------

Associated Fire Equipment (Pg. 235)	<u>1.39/day</u>
-------------------------------------	-----------------

2.73/day

Adjustment for Sale Size

	<u>Up to 3MM</u>	<u>3 to 8MM</u>	<u>8MM &amp; Larger</u>
Equipment	\$2.73/day	\$2.73/day	\$437 (8 months)
Wages	7.32/day	\$585. 4 (mos.)	1171 (8 months)
Days of Production	60 days	50M/day	
Cost/M	\$603/3MM .20/M	\$585 + \$.05 /M	\$1608.00

Month = 20 working days



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

e. Activity - FIRE PROTECTION & HAZARD REDUCTION  
Operations - FIRE PROTECTION - TRAILER MOUNT PUMP - COST BY SIZE  
Reference for Cost Table ILLUSTRATION 5 TABLE 1

I Determining Hourly Cost

A. <u>Machine Rates</u> Machine/Time	<u>Fixed</u>	<u>Operating</u>	<u>Total</u> <u>DAY</u>
1. <u>TRAILER MOUNTED PUMP -</u> <u>'COMPLETE'</u>			<u>3.68</u>
2. <u>ASSOCIATED FIRE EQUIPMENT.</u>			<u>1.29</u>
3. _____			
4. _____			
5. _____			
6. _____			

Total Machine Rate . . . . \$ 4.97 / DAY

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>DAY</u> <u>Hour</u> Rate	<u>Total</u>
1. <u>LABORER -</u> <u>(1 HOUR / DAY)</u>	<u>6.82</u>	<u>6.82</u>
2. _____		
3. _____		

(C-2, e-2)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

Total Wage Rate \$6.82

## I Updating Costs

Wages \$6.82 x 1.074 = \$7.32/day

## Equipment

Trailer Mounted Pump (page 231) \$3.97/day

Associated fire equipment (page 235) 1.39/day

5.36/day

Adjustment for Sale Size

	<u>Up to 3MM</u>	<u>3 to 8 MM</u>	<u>8MM and larger</u>
Equipment	\$5.36/day	\$5.36/day	\$858 (8 months)
Wages	7.32/day	\$585 (4 months)	\$1171 (8 months)
Days of Production	60 days		
Production/day		50M/day	
Cost/M	\$760.80/3MM	\$585+	\$2029
Total cost	\$0.25/M	\$0.11/M	



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

e. Activity - FIRE PROTECTION & HAZARD REDUCTION  
Operations - FIRE PROTECTION - TRUCK MOUNTED PUMP - COST BY SIZE  
Reference for Cost Table ILLUSTRATION 5 TABLE 1

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u> <i>DAY</i>
A. <u>Machine Rates</u> Machine/Time			
1. <u>TRUCK MOUNTED PUMP</u> <u>'COMPLETE'</u>			<u>3.96</u>
2. <u>ASSOCIATED FIRE EQUIPMENT</u>			<u>1.29</u>
3.			
4.			
5.			
6.			

Total Machine Rate . . . . \$ 5.25/DAY

	<u>Hour</u>	<u>Rate</u>	<u>Total</u>
B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<i>DAY</i>		
1. <u>LABORER</u> (1-HOUR/DAY)	<u>6.82</u>		<u>6.82</u>
2.			
3.			

9333.3 - PRODUCTION COSTS  
(Schedule 19)

Total Wage Rate .....\$6.82

II Updating Costs

Wages           \$6.82   x 1.074       = \$7.32/day

Equipment

Truck mounted pump       (Page 233)           \$4.28/day

Associated fire equipment (Page 235)       1.39/day

\$5.67

Adjustment for Sale Size

	<u>Up to 3 MM</u>	<u>3 to 8 MM</u>	<u>8 MM &amp; Larger</u>
Equipment	\$5.67/day	\$5.67/day	\$907. (8 months)
Wages	\$7.32/day	\$585/ (4 months)	1171. (8 months)
Days of production	60 days	-	-
Production/Day		50 M/day	
Cost/M	779.40/3MM	.11	
	.26	\$585+ .11/M	\$2078



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

e. Activity - FIRE PROTECTION & HAZARD REDUCTION  
(3) Operations - FIRE PROTECTION - FIRE LINE CONSTRUCTION - TRACTOR

Reference for Cost Table ILLUSTRATION 5 TABLE 2

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. <u>TRACTOR CAT D7F</u> <u>MACHINE RATE</u>	<u>6.24</u>	<u>7.32</u>	<u>13.56</u>
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
Total Machine Rate . . . . \$			<u>13.56</u>

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	<u>Hour Rate</u>	<u>Total</u>
1. <u>TRACTOR OPERATOR</u>	<u>8.75</u>	<u>8.75</u>
2. _____	_____	_____
3. _____	_____	_____

(C-2, e-3)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
 5. \_\_\_\_\_  
 6. \_\_\_\_\_  
 7. \_\_\_\_\_  
 8. \_\_\_\_\_

Total Wage Rate \$ 8.75

C. General and Administrative Costs  
 10% of Machine and Wage Rates

\$ 22.31 X 10% . . . . . \$ 2.23

D. Total Costs . . . . . \$ 24.54

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	<u>53.3</u>	X	<u>1.080</u>	=	<u>.576</u>	
<u>Oil and Gas</u>	<u>07.6</u>	X	<u>2.452</u>	=	<u>.186</u>	
<u>Wages</u>	<u>39.1</u>	X	<u>1.074</u>	=	<u>.420</u>	
_____	_____	X	_____	=	_____	Schedule 18 Cost

100.0% Weighted Index = 1.182 X \$ 24.54

Schedule 19 Cost = \$ 29.01

\$ 4.40/station

III Misc. Add'l Costs/Adjustments

Adjustment for Cost per Station  
Production - 1 mile per 8 hrs.  
8 x \$29.01 = \$232.08/mile  
\$232.08/52.8 stations = \$4.40



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Operating Cost Computations

e. Activity - FIRE PROTECTION & HAZARD REDUCTION  
(4) Operations - FIRE PROTECTION - FIRE TRAIL CONSTRUCTION - HAND TRAIL  
Reference for Cost Table ILLUSTRATION 5 TABLE 2

I Determining Hourly Cost

	<u>Fixed</u>	<u>Operating</u>	<u>Total</u>
A. <u>Machine Rates</u> Machine/Time			
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____

Total Machine Rate . . . . \$ \_\_\_\_\_

B. <u>Wage Rates</u> (Adjusted Hourly Rate) Crew Position/Time	Hour Rate	Total
* 1. <u>LABOR</u> (64 Hours)	<u>64 x 6.82</u>	<u>436.48</u>
2. _____	_____	_____
3. _____	_____	_____

(C-2, e-4)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

4. \_\_\_\_\_  
 5. \_\_\_\_\_  
 6. \_\_\_\_\_  
 7. \_\_\_\_\_  
 8. \_\_\_\_\_

Total Wage Rate \$ 436.48

C. General and Administrative Costs  
 10% of Machine and Wage Rates

\$ 436.48 X 10% . . . . . \$ 43.65

D. Total Costs . . . . . \$ 480.13

II Updating Costs

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
<u>Equipment</u>	_____	X	_____	=	_____	
<u>Oil and Gas</u>	_____	X	_____	=	_____	
<u>Wages</u>	<u>1.00</u>	X	<u>1.074</u>	=	<u>1.074</u>	
_____	_____	X	_____	=	_____	Schedule 18 Cost

100.0% Weighted Index = 1.074 X \$ 480.13

Schedule 19 Cost = \$ 515.66/mi.

\$ 9.75/station

III Misc. Add'l Costs/Adjustments

Adjustment for cost/station

Production 64 hrs. manual labor per mile of hand rail

\$515.66 - per mile/62.8 stations = \$9.77/station

\$9.75 rounded



9333.3 - PRODUCTION COSTS  
(Schedule 19)

3. Cost and Production Studies. Summaries of individual time and motion studies are recorded in the following tables. In some cases, regression equations for the particular studies are included. Not all BLM logging cost studies nor all components of the included studies have been recorded in this appendix. Only major studies with specific operational times are included. This data is grouped by major functions and referenced to specific cost tables in the schedule.





9333.3 - PRODUCTION COSTS  
Schedule 19

C- 3. Cost And Production Studies

a. Activity - Falling & Bucking

(1) Operations - Merchantable Trees - Western Oregon

Reference for Cost Table Illustration 1, Table 1

Falling and Bucking Operating Time - Minutes per MBF Gross  
Volume 1/2/

No. of 16' Logs	Per cent Top Loss										
	0	5	10	15	20	25	30	35	40	45	50
1	46.45	45.98	45.49	45.01	44.52	44.03	43.55	43.06	42.59	42.10	41.61
2	38.00	37.51	37.03	36.55	36.06	35.57	35.10	34.61	34.13	33.64	33.15
3	30.67	30.18	29.71	29.22	28.73	28.25	27.76	27.27	26.80	26.31	25.83
4	24.46	23.98	23.49	23.00	22.53	22.04	21.56	21.07	20.58	20.10	19.61
5	19.38	18.89	18.41	17.92	17.44	16.95	16.46	15.99	15.50	15.01	14.53
6	15.41	14.91	14.45	13.96	13.47	12.99	12.50	12.03	11.54	11.06	10.57
7	12.57	12.08	11.61	11.12	10.64	10.15	9.66	9.18	8.69	8.22	7.73
8	10.85	10.37	9.88	9.41	8.92	8.43	7.95	7.46	6.99	6.50	6.01
9	10.26	9.77	9.30	8.81	8.33	7.84	7.35	6.87	6.38	5.91	5.42

1/ Regression equation:

$$Y = 33.1054 - 7.2427X_1 + .0692X_2 - .0306X_3 - .4011X_4$$

Y = Falling and bucking time per MBF gross volume

X<sub>1</sub> = Number of 16' logs

X<sub>2</sub> = Recovery per cent  $\frac{(\text{Gross volume} - \text{Top loss})}{\text{Gross Volume}}$

X<sub>3</sub> = Number of stems per acre

X<sub>4</sub> = Number of 16' logs squared

2/ Miscellaneous delay time of 40% is included in table.

9333.3 - PRODUCTION COSTS

Schedule 1<sup>9</sup>

Cost And Production Studies

2. Activity - Falling & Bucking  
(2) Operations - Unmerchantable Snags and Culls - Western and Eastern Oregon  
Reference for Cost Table Illustration 1, Table 3

Operating Time - Time per Stem for Falling Unmerchantable Snags  
and Green Culls

<u>D.B.H.</u>	<u>Time per Stem 1/</u>
8	2.62
12	4.38
16	6.14
20	7.90
24	9.66
28	11.42
32	13.18
36	14.94
40	16.70
44	18.46
48	20.22
52	21.98
56	23.74
60	25.50
64	27.26
68	29.02
72	30.78
76	32.54
80	34.30
84	36.06
88	37.82
92	39.58
96	41.34
100	43.10

1/ Equation:  $Y = .44X - .90$   
Y = Time per stem in minutes  
X = D.b.h. in inches



9333.3 - PRODUCTION COSTS  
Schedule 19Cost And Production Studies2. Activity - Falling & Bucking(3) Operations - Commercial Thinnings - Western OregonReference for Cost Table Illustration 1, Table 5Falling and Bucking Operating Time - Minutes per tree(a) Development of Time Components (from PNW-41)

Walking to tree; regression equation:

$$Y_1 = 2.332 - 0.01033T_1 + 0.0000182(T_1)^2 - 0.01235T_3$$

Where:

 $Y_1$  = Time per tree in minutes $T_1$  = Number of trees per acre before cut $T_3$  = Number of trees cut per acre

For BLM thinning sale conditions,  $T_1$  average is 170,  
 $T_3$  average is 51 and  $Y_1 = 0.472$  minute (use as a  
constant).

Swamping (clearing away of interfering brush and branches):  
Regression produced a low coefficient of determination.  
Therefore, the simple mean was used as a constant (PNW-41).

$$Y_2 = 0.21 \text{ minute per tree}$$

Falling, limbing and bucking; regression equation:

$$Y_3 = 1.3805 + 0.01134H^2 + 1.179B$$

Where:

 $Y_3$  = Time per tree in minutes $H$  = DBH in inches $B$  = Number of bucking cuts after falling (It is  
assumed here that a 32-foot log is standard)

Summation equation:

$$Y_4 = Y_1 + Y_2 + Y_3$$

$$= 0.472 + 0.21 + 1.3805 + 0.1134H^2 + 1.179B, \text{ or}$$

$$Y_4 = 2.0625 + 0.1134H^2 + 1.179B$$

9333.3 - PRODUCTION COSTS

Schedule 19

Cost And Production Studies

Computed Operating Time - Minutes per Tree

D.B.H. Inches	Number of 32-Foot Logs per Tree <sup>1/</sup>					
	1	2	3	4	5	6
8	3.968	5.146				
10	4.376	5.555	6.734			
12	4.875	6.054	7.233			
14	5.465	6.644	7.822	9.001		
16	6.145	7.324	8.503	9.682		
18	6.916	8.095	9.274	10.453		
20	7.778	8.957	10.136	11.315	12.494	
22	8.731	9.910	11.089	12.268	13.446	
24	9.674	10.853	12.032	13.211	14.489	15.668
26	10.908	12.087	13.266	14.445	15.624	16.802
28	12.133	13.312	14.491	15.670	16.849	18.027
30	13.448	14.627	15.806	16.985	18.164	19.343

Falling and Bucking Costs per Tree

These are the products of the adjusted falling and bucking costs per minute and minutes of operating time per tree.

<sup>1/</sup> The variable here is actually the number of bucking cuts after falling, with a 32-foot log as standard.



9333.3 - PRODUCTION COSTS  
(Schedule 19)  
Cost and Production Studies

Appendix 1, Page 251  
(3.b.(1))

b. Activity - Rigging, Yarding and Loading - Western Oregon

(1) Operations - Tractor Yarding

Reference for Cost Table Illustration 2, Tables 3 and 4

(1) Operating Time for Tractor Yarding in Western Oregon - Minutes per MBF Gross Volume Yarded 1/ 2/ 4/																				
16 Ft. Log Volume Scrib. Dec.C.	Yarding Distance in Feet 3/																			
	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
10	24.71	24.95	25.20	25.44	25.69	25.93	26.18	26.42	26.67	26.91	27.16	27.40	27.65	27.90	28.15	28.38	28.63	28.87	29.12	29.36
12	20.47	20.71	20.96	21.20	21.45	21.69	21.94	22.18	22.43	22.67	22.92	23.16	23.41	23.65	23.90	24.14	24.39	24.63	24.88	25.12
14	17.01	17.25	17.50	17.74	17.99	18.23	18.48	18.72	18.97	19.21	19.46	19.70	19.95	20.19	20.44	20.68	20.93	21.17	21.42	21.66
16	14.18	14.43	14.67	14.92	15.16	15.41	15.65	15.90	16.14	16.39	16.63	16.88	17.12	17.37	17.61	17.86	18.10	18.35	18.59	18.84
18	11.88	12.13	12.37	12.62	12.86	13.11	13.35	13.60	13.84	14.09	14.33	14.58	14.82	15.07	15.31	15.56	15.80	16.05	16.29	16.54
20	10.01	10.26	10.50	10.75	10.99	11.24	11.48	11.73	11.97	12.22	12.46	12.71	12.95	13.20	13.44	13.69	13.93	14.18	14.42	14.67
22	8.49	8.73	8.98	9.22	9.47	9.71	9.96	10.20	10.45	10.69	10.94	11.18	11.43	11.67	11.92	12.16	12.41	12.65	12.90	13.14
24	7.25	7.50	7.74	7.99	8.23	8.48	8.72	8.97	9.21	9.46	9.70	9.95	10.19	10.44	10.68	10.93	11.17	11.42	11.66	11.91
26	6.25	6.50	6.74	6.99	7.23	7.48	7.72	7.97	8.21	8.46	8.70	8.95	9.19	9.44	9.68	9.93	10.17	10.42	10.66	10.91
28	5.44	5.69	5.93	6.18	6.42	6.67	6.91	7.16	7.40	7.65	7.89	8.14	8.38	8.63	8.87	9.12	9.36	9.61	9.85	10.10
30	4.79	5.04	5.28	5.53	5.77	6.02	6.26	6.51	6.75	7.00	7.24	7.49	7.73	7.98	8.22	8.47	8.71	8.96	9.20	9.45
32	4.27	4.51	4.76	5.00	5.25	5.49	5.74	5.98	6.23	6.47	6.72	6.96	7.21	7.45	7.70	7.94	8.19	8.43	8.68	8.92
34	3.85	4.10	4.34	4.59	4.83	5.08	5.32	5.57	5.81	6.06	6.30	6.55	6.79	7.04	7.28	7.53	7.77	8.02	8.26	8.51
36	3.52	3.77	4.01	4.26	4.50	4.75	4.99	5.24	5.48	5.73	5.97	6.22	6.46	6.71	6.95	7.20	7.44	7.69	7.93	8.18
38	3.26	3.51	3.75	4.00	4.24	4.49	4.73	4.98	5.22	5.47	5.71	5.96	6.20	6.45	6.69	6.94	7.18	7.43	7.67	7.92
40	3.06	3.30	3.55	3.79	4.04	4.28	4.53	4.77	5.02	5.26	5.51	5.75	6.00	6.24	6.49	6.73	6.98	7.22	7.47	7.71
42	2.91	3.15	3.40	3.65	3.89	4.13	4.38	4.62	4.87	5.11	5.36	5.60	5.85	6.09	6.34	6.58	6.83	7.07	7.32	7.56
44	2.71	2.95	3.20	3.44	3.69	3.93	4.18	4.42	4.67	4.91	5.16	5.40	5.65	5.89	6.14	6.38	6.63	6.87	7.12	7.36
46	2.59	2.84	3.08	3.33	3.57	3.82	4.06	4.31	4.55	4.80	5.04	5.29	5.53	5.78	6.02	6.27	6.51	6.76	7.00	7.25
48	2.47	2.72	2.97	3.22	3.47	3.72	3.97	4.21	4.46	4.70	4.95	5.19	5.44	5.68	5.93	6.17	6.42	6.66	6.91	7.15
50	2.35	2.60	2.85	3.10	3.35	3.60	3.85	4.10	4.35	4.60	4.84	5.09	5.33	5.58	5.82	6.07	6.31	6.56	6.80	7.05
52	2.23	2.48	2.73	2.98	3.23	3.48	3.73	3.98	4.23	4.48	4.73	4.98	5.23	5.48	5.73	5.98	6.23	6.47	6.71	6.96
54	2.11	2.36	2.61	2.86	3.11	3.36	3.61	3.86	4.11	4.36	4.61	4.86	5.11	5.36	5.61	5.86	6.11	6.36	6.61	6.86
56	2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50	4.75	5.00	5.25	5.50	5.75	6.00	6.25	6.50	6.75
58	1.88	2.13	2.38	2.63	2.88	3.13	3.38	3.63	3.88	4.13	4.38	4.63	4.88	5.13	5.38	5.63	5.88	6.13	6.38	6.63
60	1.77	2.02	2.27	2.52	2.77	3.02	3.27	3.52	3.77	4.02	4.27	4.52	4.77	5.02	5.27	5.52	5.77	6.02	6.27	6.52
62	1.65	1.90	2.15	2.40	2.65	2.90	3.15	3.40	3.65	3.90	4.15	4.40	4.65	4.90	5.15	5.40	5.65	5.90	6.15	6.40
64	1.54	1.79	2.04	2.29	2.54	2.79	3.04	3.29	3.54	3.79	4.04	4.29	4.54	4.79	5.04	5.29	5.54	5.79	6.04	6.29
66	1.43	1.68	1.93	2.18	2.43	2.68	2.93	3.18	3.43	3.68	3.93	4.18	4.43	4.68	4.93	5.18	5.43	5.68	5.93	6.18
68	1.32	1.57	1.82	2.07	2.32	2.57	2.82	3.07	3.32	3.57	3.82	4.07	4.32	4.57	4.82	5.07	5.32	5.57	5.82	6.07
70	1.21	1.46	1.71	1.96	2.21	2.46	2.71	2.96	3.21	3.46	3.71	3.96	4.21	4.46	4.71	4.96	5.21	5.46	5.71	5.96
72	1.10	1.35	1.60	1.85	2.10	2.35	2.60	2.85	3.10	3.35	3.60	3.85	4.10	4.35	4.60	4.85	5.10	5.35	5.60	5.85
74	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50	4.75	5.00	5.25	5.50	5.75
76	0.90	1.15	1.40	1.65	1.90	2.15	2.40	2.65	2.90	3.15	3.40	3.65	3.90	4.15	4.40	4.65	4.90	5.15	5.40	5.65
78	0.80	1.05	1.30	1.55	1.80	2.05	2.30	2.55	2.80	3.05	3.30	3.55	3.80	4.05	4.30	4.55	4.80	5.05	5.30	5.55
80	0.70	0.95	1.20	1.45	1.70	1.95	2.20	2.45	2.70	2.95	3.20	3.45	3.70	3.95	4.20	4.45	4.70	4.95	5.20	5.45
82	0.60	0.85	1.10	1.35	1.60	1.85	2.10	2.35	2.60	2.85	3.10	3.35	3.60	3.85	4.10	4.35	4.60	4.85	5.10	5.35
84	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50	4.75	5.00	5.25
86	0.40	0.65	0.90	1.15	1.40	1.65	1.90	2.15	2.40	2.65	2.90	3.15	3.40	3.65	3.90	4.15	4.40	4.65	4.90	5.15
88	0.30	0.55	0.80	1.05	1.30	1.55	1.80	2.05	2.30	2.55	2.80	3.05	3.30	3.55	3.80	4.05	4.30	4.55	4.80	5.05
90	0.20	0.45	0.70	0.95	1.20	1.45	1.70	1.95	2.20	2.45	2.70	2.95	3.20	3.45	3.70	3.95	4.20	4.45	4.70	4.95
92	0.10	0.35	0.60	0.85	1.10	1.35	1.60	1.85	2.10	2.35	2.60	2.85	3.10	3.35	3.60	3.85	4.10	4.35	4.60	4.85
94	0.00	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50	4.75
96		0.15	0.40	0.65	0.90	1.15	1.40	1.65	1.90	2.15	2.40	2.65	2.90	3.15	3.40	3.65	3.90	4.15	4.40	4.65
98		0.05	0.30	0.55	0.80	1.05	1.30	1.55	1.80	2.05	2.30	2.55	2.80	3.05	3.30	3.55	3.80	4.05	4.30	4.55
100		0.00	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00	2.20	2.40	2.60	2.80	3.00	3.20	3.40	3.60

1/ Regression equation:  
Y = Time in minutes per MBF 16' logs  
Y = (.3148 + .0035X<sub>1</sub> + .0213X<sub>2</sub> + 46.0659X<sub>3</sub>) x 1.40  
X<sub>1</sub> = Yarding distance in feet  
X<sub>2</sub> = Scriber Dec. C log volume in 16 foot log  
X<sub>3</sub> = e<sup>-1</sup> volume per log, where e is the base of natural logarithms and is equal to 2.7183818+.  
2/ Delay and supplemental time of 40% is included in table.  
3/ Distance logs actually travel from choker setting point to the landing.  
4/ Times are for production of one tractor. As the cost per minute for the tractor operation is based on two tractors, the cost shown under 9a, is halved before multiplying by times.

1/ Regression equation:

Y = Time in minutes per MBF 16' logs

Y =  $(.3148 + .0035X_1 + .0213X_2 + 46.0659X_3) \times 1.40$

X<sub>1</sub> = Yarding distance in feet

X<sub>2</sub> = e<sup>-1</sup> volume per log, where e is the base of natural logarithms and is equal to 2.718318+

X<sub>3</sub> = Scriber Dec. C log volume in 16 foot log

2/ Delay and supplemental time of 40% is included in table.

3/ Distance logs actually travel from choker setting point to the landing.

4/ Times are for production of one tractor. As the cost per minute for the tractor operation is based on two tractors, the cost shown under 9a, is halved before multiplying by times.

(3.b.(1))

9333.3 - PRODUCTION COSTS  
Schedule 19

Range of Conditions on Study Areas

- |     |                          |                              |
|-----|--------------------------|------------------------------|
| (1) | Slope                    | - 45% downhill to 45% uphill |
| (2) | Stems per acre           | - 23 to 100                  |
| (3) | Yarding distance         | - 50 to 1490 feet            |
| (4) | Logs per turn            | - 1 to 7                     |
| (5) | Volume per log           | - 72 to 1306                 |
| (6) | Number of tractors       | - 1 to 3 per side            |
| (7) | Number of choker setters | - 1 or 2 per tractor         |



## Schedule 19

## Cost And Production Studies

(3.b.(2))

6. Activity - Rigging, Yarding and Loading - Western Oregon  
 (2) Operations - Tractor Yarding - Partial Cut

Reference for Cost Table Illustration 2, Tables 6 and 7

2) Operating Time for Partial Cut Tractor Yarding Operations in - Minutes per MBF Gross Volume Yarded 1/2/ 6/ Western Oregon																					
		Yarding Distance in Feet 3/																			
16 Ft. Log Volume Scrib. Dec.C.		50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
6	51.92	52.38	52.84	53.30	53.76	54.22	54.67	55.13	55.59	56.05	56.51	56.97	57.43	57.89	58.35	58.81	59.26	59.72	60.18	60.64	
8	44.20	44.66	45.12	45.58	46.04	46.50	46.96	47.41	47.87	48.33	48.79	49.25	49.71	50.17	50.63	51.09	51.55	52.01	52.46	52.92	
10	37.84	38.30	38.76	39.22	39.67	40.13	40.59	41.05	41.51	41.97	42.43	42.89	43.35	43.81	44.26	44.72	45.18	45.64	46.10	46.56	
12	32.58	33.04	33.50	33.96	34.42	34.88	35.34	35.80	36.26	36.71	37.17	37.63	38.09	38.55	39.01	39.47	39.93	40.39	40.85	41.30	
14	28.24	28.70	29.15	29.61	30.07	30.53	30.99	31.45	31.91	32.37	32.83	33.29	33.75	34.20	34.66	35.12	35.58	36.04	36.50	36.96	
16	24.63	25.09	25.55	26.01	26.47	26.93	27.39	27.85	28.31	28.77	29.22	29.68	30.14	30.60	31.06	31.52	31.98	32.44	32.90	33.36	
18	21.64	22.10	22.56	23.02	23.48	23.93	24.39	24.85	25.31	25.77	26.23	26.69	27.15	27.61	28.07	28.53	28.98	29.44	29.90	30.36	
20	19.14	19.60	20.06	20.52	20.98	21.44	21.90	22.36	22.82	23.28	23.73	24.19	24.65	25.11	25.57	26.03	26.49	26.95	27.41	27.87	
22	17.06	17.52	17.97	18.43	18.89	19.35	19.81	20.27	20.73	21.19	21.65	22.11	22.56	23.02	23.48	23.94	24.40	24.86	25.32	25.78	
24	15.30	15.76	16.22	16.68	17.14	17.60	18.06	18.52	18.97	19.43	19.89	20.35	20.81	21.27	21.73	22.19	22.65	23.11	23.56	24.02	
26	13.82	14.28	14.74	15.20	15.66	16.12	16.58	17.04	17.49	17.95	18.41	18.87	19.33	19.79	20.25	20.71	21.17	21.63	22.08	22.54	
28	12.57	13.02	13.48	13.94	14.40	14.86	15.32	15.78	16.24	16.70	17.16	17.62	18.07	18.53	18.99	19.45	19.91	20.37	20.83	21.29	
30	11.49	11.95	12.41	12.87	13.33	13.79	14.25	14.71	15.17	15.62	16.08	16.54	17.00	17.46	17.92	18.38	18.84	19.30	19.76	20.21	
32	10.57	11.03	11.49	11.95	12.41	12.87	13.32	13.78	14.24	14.70	15.16	15.62	16.08	16.54	17.00	17.46	17.91	18.37	18.83	19.29	
34	9.77	10.23	10.69	11.15	11.61	12.07	12.52	12.98	13.44	13.90	14.36	14.82	15.28	15.74	16.20	16.66	17.11	17.57	18.03	18.49	
36	9.07	9.53	9.99	10.45	10.91	11.37	11.82	12.28	12.74	13.20	13.66	14.12	14.58	15.04	15.50	15.96	16.42	16.87	17.33	17.79	
38	8.45	8.91	9.37	9.83	10.29	10.75	11.21	11.67	12.13	12.59	13.04	13.50	13.96	14.42	14.88	15.34	15.80	16.26	16.72	17.18	
40	7.90	8.36	8.82	9.28	9.74	10.20	10.66	11.12	11.58	12.04	12.49	12.95	13.41	13.87	14.33	14.79	15.25	15.71	16.17	16.63	
42	7.41	7.87	8.33	8.79	9.25	9.71	10.16	10.62	11.08	11.54	12.00	12.46	12.92	13.38	13.84	14.30	14.75	15.21	15.67	16.13	
44	6.96	7.42	7.88	8.34	8.80	9.26	9.72	10.17	10.63	11.09	11.55	12.01	12.47	12.93	13.39	13.85	14.31	14.76	15.22	15.68	
46	6.55	7.01	7.47	7.93	8.39	8.84	9.30	9.76	10.22	10.68	11.14	11.60	12.06	12.52	12.98	13.43	13.89	14.35	14.81	15.27	
48	6.17	6.63	7.09	7.54	8.00	8.46	8.92	9.38	9.84	10.30	10.76	11.22	11.68	12.13	12.59	13.05	13.51	13.97	14.43	14.89	
50	5.81	6.27	6.73	7.19	7.65	8.11	8.56	9.02	9.48	9.94	10.40	10.86	11.32	11.78	12.24	12.70	13.16	13.61	14.07	14.53	
52	5.47	5.93	6.39	6.85	7.31	7.77	8.23	8.69	9.15	9.61	10.06	10.52	10.98	11.44	11.90	12.36	12.82	13.28	13.74	14.20	
54	5.15	5.61	6.07	6.53	6.99	7.45	7.91	8.37	8.83	9.29	9.74	10.20	10.66	11.12	11.58	12.04	12.50	12.96	13.42	13.88	
56	4.85	5.31	5.77	6.22	6.68	7.14	7.60	8.06	8.52	8.98	9.44	9.90	10.36	10.82	11.27	11.73	12.19	12.65	13.11	13.57	
58	4.55	5.01	5.47	5.93	6.39	6.85	7.31	7.77	8.22	8.68	9.14	9.60	10.06	10.52	10.98	11.44	11.90	12.36	12.82	13.27	
60	4.27	4.73	5.18	5.64	6.10	6.56	7.02	7.48	7.94	8.40	8.86	9.32	9.77	10.23	10.69	11.15	11.61	12.07	12.53	12.99	
62	3.99	4.45	4.91	5.37	5.82	6.28	6.74	7.20	7.66	8.12	8.58	9.04	9.50	9.96	10.41	10.87	11.33	11.79	12.25	12.71	
64	3.72	4.17	4.63	5.09	5.55	6.01	6.47	6.93	7.39	7.85	8.31	8.76	9.22	9.68	10.14	10.60	11.06	11.52	11.98	12.44	
66	3.45	3.91	4.37	4.83	5.28	5.74	6.20	6.66	7.12	7.58	8.04	8.50	8.96	9.42	9.87	10.33	10.79	11.25	11.71	12.17	
68	3.18	3.64	4.10	4.56	5.02	5.48	5.94	6.40	6.86	7.32	7.78	8.23	8.69	9.15	9.61	10.07	10.53	10.99	11.45	11.91	
70	2.92	3.38	3.84	4.30	4.76	5.22	5.68	6.14	6.60	7.06	7.52	7.97	8.43	8.89	9.35	9.81	10.27	10.73	11.19	11.65	

For footnotes 1/, 2/, and 3/, and 6 - see next page.

For footnotes 1/, 2/, and 3/, and 6 - see next page.



Cost And Production Studies

Percent Slope 5/	Number of Merchantable Stems Marked Per Acre 4/																	
	5	6	7	8	9	10	11	12	13	14	15	16	17	18				
0	-1.30	-1.56	-1.83	-2.09	-2.35	-2.61	-2.87	-3.13	-3.39	-3.65	-3.91	-4.17	-4.43	-4.69				
5	-0.57	-0.83	-1.09	-1.35	-1.61	-1.87	-2.14	-2.40	-2.66	-2.92	-3.18	-3.44	-3.70	-3.96				
10	0.16	-0.10	-0.36	-0.62	-0.88	-1.14	-1.40	-1.66	-1.92	-2.18	-2.44	-2.71	-2.97	-3.23				
15	0.90	0.64	0.38	0.11	-0.15	-0.41	-0.67	-0.93	-1.19	-1.45	-1.71	-1.97	-2.23	-2.49				
20	1.63	1.37	1.11	0.85	0.59	0.33	0.07	-0.19	-0.46	-0.72	-0.98	-1.24	-1.50	-1.76				
25	2.37	2.10	1.84	1.58	1.32	1.06	0.80	0.54	0.28	0.02	-0.24	-0.50	-0.76	-1.03				
30	3.10	2.84	2.58	2.32	2.06	1.79	1.53	1.27	1.01	0.75	0.49	0.23	-0.03	-0.29				
35	3.83	3.57	3.31	3.05	2.79	2.53	2.27	2.01	1.75	1.49	1.22	0.96	0.70	0.44				
40	4.57	4.31	4.05	3.78	3.52	3.26	3.00	2.74	2.48	2.22	1.96	1.70	1.44	1.18				
45	5.30	5.04	4.78	4.52	4.26	4.00	3.74	3.47	3.21	2.95	2.69	2.43	2.17	1.91				
50	6.03	5.77	5.51	5.25	4.99	4.73	4.47	4.21	3.95	3.69	3.43	3.17	2.90	2.64				
55	6.77	6.51	6.25	5.99	5.73	5.46	5.20	4.94	4.68	4.42	4.16	3.90	3.64	3.38				
60	7.50	7.24	6.98	6.72	6.46	6.20	5.94	5.68	5.42	5.15	4.89	4.63	4.37	4.11				

1/ Regression equation:

Y = Yarding time in minutes per MBF Scribner Decimal C. volume.

$Y = (9.3167 - 0.1040X_1 + 63.8283X_2 + 0.0078X_3) \times 1.177$

$X_1$  = Scribner Decimal C volume per 16-foot log

$X_2 = e^{-.1X_1}$ , where e is the base of natural logarithms and is equal to 2.7183

$X_3$  = Yarding distance (straight line, slope distance)

2/ Delay and supplemental time of 17.7% is included in the table.

3/ Yarding distance is the average straight line slope distance from choker setting point to the landing. Do not add a factor for weave.

4/ Marked Stems - This is the number of merchantable stems marked per acre within the yarding area.

5/ Slope - This is the average slope in per cent of the area being logged as estimated by the cruiser.

6/ Times are for production of one tractor. Costs applied must be on the same base.

Loading Times. The operating times used to develop tractor loading tables are the same as the operating times for partial cut tractor yarding, as the loading production is limited to the production of the yarding operation.



## Cost and Production Studies

b. Activity - Rigging, Yarding and Loading - Eastern Oregon  
 (3) Operations - Tractor Yarding

Reference for Cost Table Illustration 2, Tables 10 and 11

(3) Operating Time for Tractor Yarding in Eastern Oregon - Minutes per MBF 1/ 2/ 5/																					
		Yarding Distance in Feet 3/																			
16' Ft.	Log 4/																				
Volume	Scrib.																				
Dec. C.		50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
4		19.29	19.51	19.73	19.95	20.17	20.39	20.61	20.83	21.05	21.27	21.49	21.71	21.93	22.15	22.37	22.59	22.81	23.03	23.25	23.47
6		18.29	18.51	18.73	18.95	19.17	19.39	19.61	19.83	20.05	20.27	20.49	20.71	20.93	21.15	21.37	21.59	21.81	22.03	22.25	22.47
8		17.32	17.54	17.76	17.98	18.20	18.42	18.64	18.86	19.08	19.30	19.52	19.74	19.96	20.18	20.40	20.62	20.84	21.06	21.28	21.50
10		16.37	16.59	16.81	17.03	17.25	17.47	17.69	17.91	18.13	18.35	18.57	18.79	19.01	19.23	19.45	19.67	19.89	20.11	20.33	20.55
12		15.45	15.67	15.89	16.11	16.33	16.55	16.77	16.99	17.21	17.43	17.65	17.87	18.09	18.31	18.53	18.75	18.97	19.19	19.41	19.63
14		14.55	14.77	14.99	15.21	15.43	15.65	15.87	16.09	16.31	16.53	16.75	16.97	17.19	17.41	17.63	17.85	18.07	18.29	18.51	18.73
16		13.67	13.89	14.11	14.33	14.55	14.77	14.99	15.21	15.43	15.65	15.87	16.09	16.31	16.53	16.75	16.97	17.19	17.41	17.63	17.85
18		12.83	13.05	13.27	13.49	13.71	13.93	14.15	14.37	14.59	14.81	15.03	15.25	15.47	15.69	15.91	16.13	16.35	16.57	16.79	17.01
20		12.00	12.22	12.44	12.66	12.88	13.10	13.32	13.54	13.76	13.98	14.20	14.42	14.64	14.86	15.08	15.30	15.52	15.74	15.96	16.18
22		11.20	11.42	11.64	11.86	12.08	12.30	12.52	12.74	12.96	13.18	13.40	13.62	13.84	14.06	14.28	14.50	14.72	14.94	15.16	15.38
24		10.43	10.65	10.87	11.09	11.31	11.53	11.75	11.97	12.19	12.41	12.63	12.85	13.07	13.29	13.51	13.73	13.95	14.17	14.39	14.61
26		9.68	9.90	10.12	10.34	10.56	10.78	11.00	11.22	11.44	11.66	11.88	12.10	12.32	12.54	12.76	12.98	13.20			
28		8.95	9.17	9.39	9.61	9.83	10.05	10.27	10.49	10.71	10.93	11.15	11.37	11.59	11.81	12.03	12.25	12.47			
30		8.25	8.47	8.69	8.91	9.13	9.35	9.57	9.79	10.01	10.23	10.45	10.67	10.89	11.11	11.33	11.55	11.77			
32		7.58	7.80	8.02	8.24	8.46	8.68	8.90	9.12	9.34	9.56	9.78	10.00	10.22							
34		6.93	7.15	7.37	7.59	7.81	8.03	8.25	8.47	8.69	8.91	9.13	9.35	9.57							
36		6.30	6.52	6.74	6.96	7.18	7.40	7.62	7.84	8.06											
38		5.70	5.92	6.14	6.36	6.58	6.80	7.02	7.24	7.46											
40		5.13	5.35	5.57	5.79	6.01	6.23	6.45	6.67	6.89											
44		4.05	4.27	4.49	4.71	4.93															
1/ Regression equation: Y = Time in minutes Y = 21.1374 + .0044X <sub>1</sub> - .5298X <sub>2</sub> + .0031X <sub>3</sub> X <sub>1</sub> = Distance in feet X <sub>2</sub> = Volume of average log in Dec. C - 28 ft. logs X <sub>3</sub> = (X <sub>2</sub> ) <sup>2</sup>																					
2/ Supplemental time of 24.4% is included in table (included in above equation).																					
3/ Distance logs actually travel from choker setting point to the landing.																					
4/ Volume factor of .571 was used to adjust 28 ft. logs to 16 ft. logs.																					
5/ Times are for production of one tractor. As the cost per minute for the tractor operation is based on two tractors, the cost shown in Illustration 2, Tables 10 and 11.																					

1/ Regression equation:

Y = Time in minutes

Y =  $21.1374 + .0044X_1 - .5298X_2 + .0031X_3$

X<sub>1</sub> = Distance in feet

X<sub>2</sub> = Volume of average log in Dec. C - 28 ft. logs

X<sub>3</sub> = (X<sub>2</sub>)<sup>2</sup>

2/ Supplemental time of 24.4% is included in table (included in above equation).

3/ Distance logs actually travel from choker setting point to the landing.

4/ Volume factor of .571 was used to adjust 28 ft. logs to 16 ft. logs.

5/ Times are for production of one tractor. As the cost per minute for the tractor operation is based on two tractors, the cost shown in Illustration 2, Tables 10 and 11.



(3.b.(4))

9333.3 - PRODUCTION COSTS  
Schedule 19  
Cost And Production Studies

b. Activity - Rigging, Yarding and Loading - western Oregon  
(4) Operations - High Lead Yarding & Hot Deck Swinging

Reference for Cost Table Illustration 2, Tables 14, 15, 18, 19, 20, 21, 26 and 27

(4) Operating Time for High-lead Yarding in Western Oregon - Minutes per MBF Gross Volume Yarded 1/ 2/

16 Ft. Log 3/ Volume Scrib. Dec.C.	Yarding (Slope) Distance in Feet																			
	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
10	15.73	16.10	16.46	16.83	17.20	17.57	17.94	18.30	18.67	19.04	19.41	19.77	20.14	20.51	20.88	21.24	21.61	21.98	22.35	22.71
12	12.11	12.47	12.84	13.21	13.58	13.94	14.31	14.68	15.05	15.41	15.78	16.15	16.52	16.88	17.25	17.62	17.99	18.36	18.72	19.09
14	9.67	10.04	10.41	10.78	11.14	11.51	11.88	12.25	12.61	12.98	13.35	13.72	14.08	14.45	14.82	15.19	15.55	15.92	16.29	16.66
16	8.04	8.41	8.77	9.14	9.51	9.88	10.24	10.61	10.98	11.35	11.71	12.08	12.45	12.82	13.19	13.55	13.92	14.29	14.66	15.02
18	6.94	7.31	7.67	8.04	8.41	8.78	9.15	9.51	9.88	10.25	10.62	10.98	11.35	11.72	12.09	12.45	12.82	13.19	13.56	13.92
20	6.20	6.57	6.93	7.30	7.67	8.04	8.40	8.77	9.14	9.51	9.87	10.24	10.61	10.98	11.35	11.71	12.08	12.45	12.82	13.18
22	5.70	6.07	6.43	6.80	7.17	7.54	7.90	8.27	8.64	9.01	9.37	9.74	10.11	10.48	10.84	11.21	11.58	11.95	12.32	12.68
24	5.36	5.73	6.09	6.46	6.83	7.20	7.57	7.93	8.30	8.67	9.04	9.40	9.77	10.14	10.51	10.87	11.24	11.61	11.98	12.34
26	5.13	5.50	5.86	6.23	6.60	6.97	7.33	7.70	8.07	8.44	8.80	9.17	9.54	9.91	10.28	10.64	11.01	11.38	11.75	12.11
28	4.97	5.34	5.71	6.07	6.44	6.81	7.18	7.54	7.91	8.28	8.65	9.01	9.38	9.75	10.12	10.48	10.85	11.22	11.59	11.95
30	4.86	5.23	5.60	5.96	6.33	6.70	7.07	7.43	7.80	8.17	8.54	8.90	9.27	9.64	10.01	10.37	10.74	11.11	11.48	11.84
32	4.78	5.15	5.52	5.89	6.25	6.62	6.99	7.36	7.72	8.09	8.46	8.83	9.19	9.56	9.93	10.30	10.66	11.03	11.40	11.77
34	4.73	5.09	5.46	5.83	6.20	6.57	6.93	7.30	7.67	8.04	8.40	8.77	9.14	9.51	9.87	10.24	10.61	10.98	11.34	11.71
36	4.69	5.05	5.42	5.79	6.16	6.52	6.89	7.26	7.63	7.99	8.36	8.73	9.10	9.46	9.83	10.20	10.57	10.94	11.30	11.67
38	4.65	5.02	5.39	5.76	6.13	6.49	6.86	7.23	7.60	7.96	8.33	8.70	9.07	9.43	9.80	10.17	10.54	10.90	11.27	11.64
40	4.63	5.00	5.37	5.73	6.10	6.47	6.84	7.20	7.57	7.94	8.31	8.67	9.04	9.41	9.78	10.14	10.51	10.88	11.25	11.61
42	4.61	4.98	5.35	5.71	6.08	6.45	6.82	7.18	7.55	7.92	8.29	8.65	9.02	9.39	9.76	10.12	10.49	10.86	11.23	11.59
44	4.59	4.96	5.33	5.70	6.06	6.43	6.80	7.17	7.53	7.90	8.27	8.64	9.00	9.37	9.74	10.11	10.47	10.84	11.21	11.58
46	4.58	4.94	5.31	5.68	6.05	6.42	6.78	7.15	7.52	7.89	8.25	8.62	8.99	9.36	9.72	10.09	10.46	10.83	11.19	11.56
48	4.56	4.93	5.30	5.67	6.03	6.40	6.77	7.14	7.50	7.87	8.24	8.61	8.97	9.34	9.71	10.08	10.44	10.81	11.18	11.55
50	4.55	4.92	5.29	5.65	6.02	6.39	6.76	7.12	7.49	7.86	8.23	8.59	8.96	9.33	9.70	10.06	10.43	10.80	11.17	11.53
52	4.54	4.91	5.27	5.64	6.01	6.38	6.74	7.11	7.48	7.85	8.21	8.58	8.95	9.32	9.68	10.05	10.42	10.79	11.15	11.52
54	4.53	4.89	5.26	5.63	6.00	6.36	6.73	7.10	7.47	7.83	8.20	8.57	8.94	9.30	9.67	10.04	10.41	10.77	11.14	11.51
56	4.51	4.88	5.25	5.62	5.98	6.35	6.72	7.09	7.45	7.82	8.19	8.56	8.92	9.29	9.66	10.03	10.40	10.76	11.13	11.50
58	4.50	4.87	5.24	5.60	5.97	6.34	6.71	7.08	7.44	7.81	8.18	8.55	8.91	9.28	9.65	10.02	10.38	10.75	11.12	11.49
60	4.49	4.86	5.23	5.59	5.96	6.33	6.70	7.06	7.43	7.80	8.17	8.53	8.90	9.27	9.64	10.00	10.37	10.74	11.11	11.47
62	4.48	4.85	5.21	5.58	5.95	6.32	6.68	7.05	7.42	7.79	8.16	8.52	8.89	9.26	9.63	9.99	10.36	10.73	11.10	11.46
64	4.47	4.84	5.20	5.57	5.94	6.31	6.67	7.04	7.41	7.78	8.14	8.51	8.88	9.25	9.61	9.98	10.35	10.72	11.08	11.45
66	4.46	4.82	5.19	5.56	5.93	6.29	6.66	7.03	7.40	7.76	8.13	8.50	8.87	9.24	9.60	9.97	10.34	10.71	11.07	11.44
68	4.45	4.81	5.18	5.55	5.92	6.28	6.65	7.02	7.39	7.75	8.12	8.49	8.86	9.22	9.59	9.96	10.33	10.69	11.06	11.43
70	4.43	4.80	5.17	5.54	5.90	6.27	6.64	7.01	7.37	7.74	8.11	8.48	8.84	9.21	9.58	9.95	10.32	10.68	11.05	11.42
72	4.42	4.79	5.16	5.53	5.89	6.26	6.63	7.00	7.36	7.73	8.10	8.47	8.83	9.20	9.57	9.94	10.30	10.67	11.04	11.41
74	4.41	4.78	5.15	5.51	5.88	6.25	6.62	6.98	7.35	7.72	8.09	8.45	8.82	9.19	9.56	9.92	10.29	10.66	11.03	11.40
76	4.40	4.77	5.13	5.50	5.87	6.24	6.61	6.97	7.34	7.71	8.08	8.44	8.81	9.18	9.55	9.91	10.28	10.65	11.02	11.38
78	4.39	4.76	5.12	5.49	5.86	6.23	6.59	6.96	7.33	7.70	8.06	8.43	8.80	9.17	9.53	9.90	10.27	10.64	11.01	11.37

GPO 858-061



9333.3 - PRODUCTION COSTS

Schedule 19

Cost and Production Studies

Operating Time for High-lead Yarding in Western Oregon - Minutes per MBF Gross Volume Yarded 1/ 2/ (contd.)

16 Ft. Log 3/ Volume Scrib. Dec.C.	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
	Yarding (Slope) Distance in Feet																			
80	4.38	4.74	5.11	5.48	5.85	6.22	6.58	6.95	7.32	7.69	8.05	8.42	8.79	9.16	9.52	9.89	10.26	10.63	10.99	11.36
82	4.37	4.73	5.10	5.47	5.84	6.20	6.57	6.94	7.31	7.67	8.04	8.41	8.78	9.14	9.51	9.88	10.25	10.61	10.98	11.35
84	4.35	4.72	5.09	5.46	5.82	6.19	6.56	6.93	7.30	7.66	8.03	8.40	8.77	9.13	9.50	9.87	10.24	10.60	10.97	11.34
86	4.34	4.71	5.08	5.45	5.81	6.18	6.55	6.92	7.28	7.65	8.02	8.39	8.75	9.12	9.49	9.86	10.22	10.59	10.96	11.33
88	4.33	4.70	5.07	5.43	5.80	6.17	6.54	6.91	7.27	7.64	8.01	8.38	8.74	9.11	9.48	9.85	10.21	10.58	10.95	11.32
90	4.32	4.69	5.06	5.42	5.79	6.16	6.53	6.89	7.26	7.63	8.00	8.36	8.73	9.10	9.47	9.83	10.20	10.57	10.94	11.30

1/ Regression equation:

Y = Time in minutes

Y = (3.62719 - .002296X<sub>1</sub> + .005977X<sub>2</sub> + 65.824028X<sub>3</sub>) x 1.23

X<sub>1</sub> = Scribner Decimal C log volume in woods length logs

X<sub>2</sub> = Yarding distance in feet

X<sub>3</sub> = e<sup>-1</sup> volume per log, where e is the base of natural logarithms and is equal to 2.7182818+

2/ Delay and supplemental time of 23% is included in table.

3/ Volume factor .5 was used to adjust woods length logs to 16 foot logs.

Range of Conditions on High-lead Study Areas.

- (1) Volume per log - 30 board feet to 6,120 board feet
- (2) Line slope - minus 35% to plus 65%
- (3) Stems per acre - 26 to 74
- (4) Yarding distance - 100 feet to 1,350 feet

Loading Times. The operating times used to develop high-lead loading tables are the same as the operating times for high-lead yarding as the loading production is limited to the production of the yarding operation.

Activity - Rigging, Yarding and Loading - Western Oregon  
(5) Operations - Skyline Yarding  
Reference for Cost Table Illustration 2, Tables 24 and 25

(5) OPERATION TIME FOR STATIC SKYLINE YARDING IN CLEAR CUTS (USING RADIO-CONTROLLED SKYCAR)															
16 FT. LOG VOLUME SCRIB. DEC.C.		MINUTES PER MBF GROSS VOLUME YARDED 1/ 2/													
		YARDING (SLOPE) DISTANCE IN FEET													
		500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800
10	9.33	9.47	9.63	9.81	10.02	10.26	10.52	10.80	11.11	11.44	11.80	12.18	12.59	13.02	
12	7.26	7.39	7.55	7.74	7.95	8.18	8.44	8.73	9.04	9.37	9.73	10.11	10.52	10.95	
14	5.87	6.00	6.17	6.35	6.56	6.79	7.05	7.34	7.65	7.98	8.34	8.72	9.13	9.56	
16	4.94	5.07	5.23	5.42	5.63	5.86	6.12	6.41	6.71	7.05	7.41	7.79	8.20	8.63	
18	4.31	4.45	4.61	4.79	5.00	5.24	5.50	5.78	6.09	6.42	6.78	7.16	7.57	8.00	
20	3.89	4.03	4.19	4.38	4.59	4.82	5.08	5.36	5.67	6.01	6.36	6.75	7.15	7.59	
22	3.61	3.75	3.91	4.10	4.31	4.54	4.80	5.08	5.39	5.72	6.08	6.47	6.87	7.30	
24	3.43	3.56	3.72	3.91	4.12	4.35	4.61	4.90	5.20	5.54	5.89	6.28	6.68	7.12	
26	3.30	3.44	3.60	3.78	3.99	4.23	4.49	4.77	5.08	5.41	5.77	6.15	6.56	6.99	
28	3.22	3.35	3.51	3.70	3.91	4.14	4.40	4.68	4.99	5.33	5.68	6.07	6.47	6.91	
30		3.29	3.46	3.64	3.85	4.08	4.34	4.63	4.94	5.27	5.63	6.01	6.42	6.85	
32		3.26	3.42	3.60	3.81	4.05	4.31	4.59	4.90	5.23	5.59	5.97	6.38	6.81	
34		3.23	3.39	3.58	3.79	4.02	4.28	4.56	4.87	5.21	5.56	5.95	6.35	6.79	
36		3.21	3.37	3.56	3.77	4.00	4.26	4.55	4.86	5.19	5.55	5.93	6.34	6.77	
38		3.20	3.36	3.55	3.76	3.99	4.25	4.54	4.84	5.18	5.54	5.92	6.33	6.76	
40			3.36	3.54	3.75	3.99	4.24	4.53	4.84	5.17	5.53	5.91	6.32	6.75	
45			3.35	3.53	3.74	3.98	4.23	4.52	4.83	5.16	5.52	5.90	6.31	6.74	
50			3.34	3.53	3.74	3.97	4.23	4.51	4.82	5.16	5.51	5.90	6.30	6.74	
55			3.34	3.53	3.74	3.97	4.23	4.51	4.82	5.16	5.51	5.90	6.30	6.74	
60			3.34	3.53	3.74	3.97	4.23	4.51	4.82	5.15	5.51	5.90	6.30	6.73	
65			3.34	3.53	3.74	3.97	4.23	4.51	4.82	5.15	5.51	5.90	6.30	6.73	
70			3.34	3.53	3.74	3.97	4.23	4.51	4.82	5.15	5.51	5.90	6.30	6.73	
75			3.34	3.53	3.74	3.97	4.23	4.51	4.82	5.15	5.51	5.90	6.30	6.73	
80			3.34	3.53	3.74	3.97	4.23	4.51	4.82	5.15	5.51	5.90	6.30	6.73	
85			3.34	3.53	3.74	3.97	4.23	4.51	4.82	5.15	5.51	5.90	6.30	6.73	
1/ REGRESSION EQUATIONS															
YARDING TIME (MIN.) PER MBF = 1.215 X (2.2513 + 0.00010159 X SLOPE DIST. SQ. + 30.235550 X E															
E = THE BASE OF NATURAL LOGARITHMS AND IS EQUAL TO 2.7183.															
V = SCRIB. DEC. C. VOLUME PER 16 FT. LOG.															
2/ DELAY TIME OF 21.5 PER CENT IS INCLUDED IN THE ABOVE TABLE.															
(-.2 X V)															

1/ REGRESSION EQUATIONS:  
YARDING TIME (MIN.) PER MBF =  $1.215 \times (2.2513 + 0.00010159 \times \text{SLOPE DIST. SQ.} + 38.235550 \times E)$   
E = THE BASE OF NATURAL LOGARITHMS AND IS EQUAL TO 2.7183.  
V = SCRIB. DEC. C. VOLUME PER 16 FT. LOG.  
2/ DELAY TIME OF 21.5 PER CENT IS INCLUDED IN THE ABOVE TABLE.



9333.3 - PRODUCTION COSTS

(Schedule 19)

Cost and Production Studies

OPERATION TIME FOR STATIC SKYLINE YARDING IN CLEAR CUTS (USING RADIO-CONTROLLED SKYCAR)														
16 FT. LOG VOLUME SCRIB. DEC.C.	MINUTES PER MBF GROSS VOLUME YARDED 1 / 2 /													
	YARDING (SLOPE) DISTANCE IN FEET													
	1900	2000	2100	2200	2300	2400	2500	2600	2700	2800	2900	3000	3100	3200
10	13.48	13.96	14.47	15.00	15.55	16.13	16.74	17.37	18.02	18.70	19.40	20.13	20.88	21.66
12	11.41	11.89	12.39	12.92	13.48	14.06	14.66	15.29	15.95	16.63	17.33	18.06	18.81	19.59
14	10.02	10.50	11.00	11.53	12.09	12.67	13.27	13.90	14.56	15.24	15.94	16.67	17.42	18.20
16	9.08	9.57	10.07	10.60	11.16	11.74	12.34	12.97	13.63	14.31	15.01	15.74	16.49	17.27
18	8.46	8.94	9.45	9.98	10.53	11.11	11.72	12.35	13.00	13.68	14.39	15.11	15.87	16.64
20	8.04	8.52	9.03	9.56	10.12	10.70	11.30	11.93	12.58	13.26	13.97	14.69	15.45	16.23
22	7.76	8.24	8.75	9.28	9.84	10.42	11.02	11.65	12.30	12.98	13.69	14.41	15.17	15.94
24	7.57	8.05	8.56	9.09	9.65	10.23	10.83	11.46	12.12	12.79	13.50	14.23	14.98	15.76
26	7.45	7.93	8.43	8.97	9.52	10.10	10.71	11.34	11.99	12.67	13.37	14.10	14.85	15.63
28	7.36	7.84	8.35	8.88	9.44	10.02	10.62	11.25	11.91	12.58	13.29	14.02	14.77	15.55
30	7.31	7.79	8.29	8.82	9.38	9.96	10.56	11.19	11.85	12.53	13.23	13.96	14.71	15.49
32	7.27	7.75	8.26	8.79	9.34	9.92	10.53	11.16	11.81	12.49	13.19	13.92	14.67	15.45
34	7.24	7.72	8.23	8.76	9.32	9.90	10.50	11.13	11.79	12.46	13.17	13.90	14.65	15.43
36	7.23	7.71	8.21	8.74	9.30	9.88	10.48	11.11	11.77	12.45	13.15	13.88	14.63	15.41
38	7.21	7.70	8.20	8.73	9.29	9.87	10.47	11.10	11.76	12.44	13.14	13.87	14.62	15.40
40	7.21	7.69	8.19	8.72	9.28	9.86	10.47	11.09	11.75	12.43	13.13	13.86	14.61	15.39
45	7.20	7.68	8.18	8.72	9.27	9.85	10.46	11.08	11.74	12.42	13.12	13.85	14.60	15.38
50	7.19	7.67	8.18	8.71	9.27	9.85	10.45	11.08	11.74	12.41	13.12	13.85	14.60	15.38
55	7.19	7.67	8.18	8.71	9.27	9.85	10.45	11.08	11.73	12.41	13.12	13.84	14.60	15.38
60	7.19	7.67	8.18	8.71	9.27	9.85	10.45	11.08	11.73	12.41	13.12	13.84	14.60	15.37
65	7.19	7.67	8.18	8.71	9.26	9.84	10.45	11.08	11.73	12.41	13.12	13.84	14.60	15.37
70	7.19	7.67	8.18	8.71	9.26	9.84	10.45	11.08	11.73	12.41	13.12	13.84	14.60	15.37
75	7.19	7.67	8.18	8.71	9.26	9.84	10.45	11.08	11.73	12.41	13.12	13.84	14.60	15.37
80	7.19	7.67	8.18	8.71	9.26	9.84	10.45	11.08	11.73	12.41	13.12	13.84	14.60	15.37
85	7.19	7.67	8.18	8.71	9.26	9.84	10.45	11.08	11.73	12.41	13.12	13.84	14.60	15.37

1 / REGRESSION EQUATION:  
YARDING TIME (MIN.) PER MBF = 1.215 X (2.2513 + 0.00010159 X SLOPE DIST. SQ. + 38.235550 X E  
E = THE BASE OF NATURAL LOGARITHMS AND IS EQUAL TO 2.7183.  
V = SCRIB. DEC. C. VOLUME PER 16 FT. LOG.

2 / DELAY TIME OF 21.5 PER CENT IS INCLUDED IN THE ABOVE TABLE.

1 / REGRESSION EQUATION:  
YARDING TIME (MIN.) PER MBF =  $1.215 \times (2.2513 + 0.00010159 \times \text{SLOPE DIST. SQ.} + 38.235550 \times E)$   
E = THE BASE OF NATURAL LOGARITHMS AND IS EQUAL TO 2.7183.  
V = SCRIB. DEC. C. VOLUME PER 16 FT. LOG.  
2 / DELAY TIME OF 21.5 PER CENT IS INCLUDED IN THE ABOVE TABLE.

9333.3 - PRODUCTION COSTS

Schedule 19

Cost And Production Studies

Activity - Rigging, Yarding and Loading - Western Oregon

Operations - Skyline Yarding

Reference for Cost Table Illustration 2, Tables 24 and 25

Range of Conditions on Skyline Study Areas

- (a) Volume per log (in terms of 16 foot segments of log lengths actually yarded)- 37 board feet to 1,252 board feet (downhill yarding); 19 board feet to 1,727 board feet (uphill yarding).
- (b) Number of 16 foot logs per log length actually yarded - 0.8 to 6 (downhill yarding); 0.5 to 5 (uphill yarding).
- (c) Skyline slope (on chord) - minus 10% (downhill yarding) to plus 50% (uphill yarding).
- (d) Lateral slope (at right angles to skyline) - minus 90% to plus 100%.
- (e) Yarding distance (along average ground slope) - 100 feet to 2,450 feet.
- (f) Lateral skidding distance - 0 to 250 feet.
- (g) Skyline road widths: average - 150 feet  
maximum - 400 feet



## Cost And Production Studies

(3.b.(6))

b. Activity Rigging, Yarding and Loading - Western and Eastern Oregon(c) Operations Misc. Small Sale Operation - Yarding by Yarder/LoaderReference for Cost Table Illustration 2, Table 32

(6) Operating Time for Light Yarder-Loader - Minutes per MBF Gross Volume <u>1/ 2/</u>		Yarding Distance in Feet									
16' Log Volume Scrib. Dec. C. 3/		50	100	150	200	250	300	350	400	450	500
4	27.27	28.28	29.30	30.31	31.32	32.34	33.35	34.36	35.38	36.39	
6	25.89	26.91	27.92	28.93	29.95	30.96	31.97	32.99	34.00	35.01	
8	24.54	25.55	26.57	27.58	28.59	29.61	30.62	31.63	32.65	33.66	
10	23.22	24.23	25.24	26.26	27.27	28.28	29.30	30.31	31.32	32.34	
12	21.92	22.93	23.95	24.96	25.97	26.99	28.00	29.01	30.03	31.04	
14	20.65	21.66	22.68	23.69	24.70	25.72	26.73	27.74	28.75	29.77	
16	19.40	20.42	21.43	22.44	23.46	24.47	25.48	26.50	27.51	28.52	
18	18.19	19.20	20.21	21.23	22.24	23.25	24.27	25.28	26.29	27.31	
20	17.00	18.01	19.02	20.04	21.05	22.06	23.08	24.09	25.10	26.12	
22	15.83	16.85	17.86	18.87	19.89	20.90	21.91	22.93	23.94	24.95	
24	14.70	15.71	16.72	17.74	18.75	19.76	20.78	21.79	22.80	23.81	
26	13.59	14.60	15.61	16.63	17.64	18.65	19.66	20.68	21.69	22.70	
28	12.50	13.52	14.53	15.54	16.55	17.57	18.58	19.59	20.61	21.62	
30	11.45	12.46	13.47	14.48	15.50	16.51	17.52	18.54	19.55	20.56	
32	10.41	11.43	12.44	13.45	14.47	15.48	16.49	17.51	18.52	19.53	
34	9.41	10.42	11.44	12.45	13.46	14.48	15.49	16.50	17.52	18.53	
36	8.43	9.45	10.46	11.47	12.49	13.50	14.51	15.53	16.54	17.55	
38	7.48	8.50	9.51	10.52	11.54	12.55	13.56	14.58	15.59	16.60	
40	6.56	7.57	8.59	9.60	10.61	11.63	12.64	13.65	14.67	15.68	
44	4.80	5.81	6.82	7.84	8.85	9.86	10.87	11.89	12.90	13.91	
48	3.14	4.15	5.16	6.18	7.19	8.20	9.22	10.23	11.24	12.26	
52		2.60	3.61	4.62	5.64	6.65	7.66	8.68	9.69	10.70	
56				3.18	4.19	5.20	6.22	7.23	8.24	9.26	
60					2.85	3.87	4.88	5.89	6.91	7.92	
64						2.64	3.65	4.66	5.68	6.69	
68							2.52	3.54	4.55	5.56	

1/ Regression equation:

Y = Time in minutes

$$Y = (24.7181 + .017217X_1 - .306850X_2 + .000710X_3) \times 1.177$$

X<sub>1</sub> = Yarding distance in feetX<sub>2</sub> = Scribner Dec. C log volume in 32 foot logsX<sub>3</sub> = Scribner Dec. C 32-foot log volume squared

2/ Delay and supplemental time of 17.7% is included in table

3/ Volume factor of .5 was used to adjust 32 ft. logs to 16 ft. logs.

9333.3 - PRODUCTION COSTS

Schedule 19

Cost And Production Studies

b. Activity - Rigging, Yarding and Loading - Western Oregon  
(7) Operations - Commercial Thinnings - Yarding With Light Crawler Tractor

Reference for Cost Table Illustration 2, Table 34

Operating Time for Light Crawler Tractor Yarding

Development of Time Components

(a) Regression equations (from PNW-41)

i. Outrun time empty:

$$Y = 1.341 + 0.004136D$$

ii. Choker setting time:

$$Y = -1.084 + 2.650N - 0.004775NT_1 + 0.00004951(T_1)^2 \underline{1/}$$

iii. Skidding time:

$$Y = 1.220 + 0.007678D \underline{2/}$$

iv. Unhooking and decking time:

$$Y = 0.6392 + 0.001421V_2 + 0.0485N^2 \underline{1/}$$

Where:

Y = Time per turn of logs in minutes

D = Slope distance in feet

N = Number of logs per turn

$T_1$  = Number of trees per acre before cut

$V_2$  = Volume per turn in board feet, Scribner  
(long log scale)

1/ Tractor operator setting and releasing chokers (no extra man).

2/ Equation incorporates possibility that poles over 48 feet in length may be skidded.



## Cost And Production Studies

V. Summation equation: For BLM commercial thinning sale conditions,  $T_1$  averages 170. In the choker setting time formula,  $0.00477NT_1$ , then becomes a constant of 0.8117N, and  $0.0004951(T_1)^2$  becomes a constant of 1.43080. Combining all equations with these constants, the summation equation for the complete skidding cycle is:

$$Y = 3.5470 + 0.011814D + 1.83825N + 0.0485N^2 + 0.001421V_2$$

Computed Operating Time - Minutes per Turn, Light Crawler Tractor Yarding

Vol. per Turn-Bd.Ft. Scrib. Short Log Scale	Vol. Ave. Log 1/ - Bd. Ft. Scribner		No. of 2/ Logs per Turn	Yarding Distance in Feet 3/										
	Short Log Scale	Long Log Scale		50	100	150	200	250	300	350	400	450	500	
200	20	20	10.0	27.65	28.25	28.84	29.43	30.02	30.61	31.20	31.79	32.38	32.97	
400	40	40	10.0	27.94	28.53	29.12	29.71	30.30	30.89	31.48	32.07	32.66	33.25	
700	70	60	10.0	28.22	28.81	29.40	29.99	30.59	31.18	31.77	32.36	32.95	33.54	
1000	100	80	10.0	28.51	29.10	29.69	30.28	30.87	31.46	32.05	32.64	33.23	33.82	
1200	120	100	10.0	28.79	29.38	29.97	30.56	31.15	31.74	32.34	32.93	33.52	34.11	
1400	140	120	10.0	29.08	29.67	30.26	30.85	31.44	32.03	32.62	33.21	33.80	34.39	
1700	170	140	10.0	29.36	29.95	30.54	31.13	31.72	32.31	32.90	33.49	34.09	34.68	
1786	190	160	9.4	27.84	28.43	29.02	29.61	30.20	30.79	31.38	31.97	32.57	33.16	
1826	220	180	8.3	24.86	25.45	26.04	26.63	27.22	27.81	28.40	28.99	29.58	30.18	
1743	260	220	6.8	21.01	21.60	22.19	22.78	23.37	23.96	24.55	25.14	25.73	26.32	
1740	300	260	5.8	18.57	19.16	19.76	20.35	20.94	21.53	22.12	22.71	23.30	23.89	
1700	340	300	5.0	16.67	17.26	17.85	18.45	19.04	19.63	20.22	20.81	21.40	21.99	
1739	370	320	4.7	15.99	16.58	17.17	17.76	18.35	18.94	19.53	20.12	20.71	21.30	
1716	390	340	4.4	15.29	15.88	16.47	17.06	17.65	18.24	18.83	19.43	20.02	20.61	
1677	430	380	3.9	14.15	14.74	15.33	15.92	16.51	17.10	17.69	18.29	18.88	19.47	
1700	500	440	3.4	13.07	13.66	14.26	14.85	15.44	16.03	16.62	17.21	17.80	18.39	
1586	610	560	2.6	11.31	11.90	12.50	13.09	13.68	14.27	14.86	15.45	16.04	16.63	
1650	660	600	2.5	11.17	11.76	12.35	12.94	13.53	14.12	14.71	15.30	15.89	16.48	

1/ 32-foot logs. PNW-41 data are based on scaling in long log lengths by United States Forest Service standards for Douglas-fir-subregion. Volumes so determined are adjusted here to approximate Bureau of Land Management short log scale.

2/ Number represents mix of log lengths as yarded, with 32-foot log considered average.

3/ Distance logs actually travel from choker setting point to landing.

1/ 32-foot logs. PNW-41 data are based on scaling in long log lengths by United States Forest Service standards for Douglas-fir. subregion. Volumes so determined are adjusted here to approximate Bureau of Land Management short log scale.

2/ Number represents mix of log lengths as yarded, with 32-foot log considered average.

3/ Distance logs actually travel from choker setting point to landing.

GPO 856-051



Schedule 19  
Cost And Production Studies

b. Activity Rigging, Yarding and Loading - Western Oregon  
(7) Operations Commercial Thinnings - Yarding With Light Crawler Tractor  
Reference for Cost Table Illustration 2, Table 34

Computed Operating Time - Minutes per Turn, Light Crawler Tractor Yarding (Contd.)														
Vol. per Turn-Bd.Ft. Scrib. Short Log Scale	Vol. Ave. Log 1/ - Bd. Ft. Scribner		No. of 2/ Logs per Turn	Yarding Distance in Feet 3/ Scale										
	Short Log Scale	Long Log Scale		550	600	650	700	750	800	850	900	950	1000	
200	20	20	10.0	33.56	34.15	34.74	35.33	35.92	36.51	37.11	37.70	38.29	38.88	
400	40	40	10.0	33.85	34.44	35.03	35.62	36.21	36.80	37.39	37.98	38.57	39.16	
700	70	60	10.0	34.13	34.72	35.31	35.90	36.49	37.08	37.67	38.26	38.86	39.45	
1000	100	80	10.0	34.41	35.00	35.60	36.19	36.78	37.37	37.96	38.55	39.14	39.73	
1200	120	100	10.0	34.70	35.29	35.88	36.47	37.06	37.65	38.24	38.83	39.42	40.01	
1400	140	120	10.0	34.98	35.57	36.16	36.75	37.35	37.94	38.53	39.12	39.71	40.30	
1700	170	140	10.0	35.27	35.86	36.45	37.04	37.63	38.22	38.81	39.40	39.99	40.58	
1786	190	160	9.4	33.75	34.34	34.93	35.52	36.11	36.70	37.29	37.88	38.47	39.06	
1826	220	180	8.3	30.77	31.36	31.95	32.54	33.13	33.72	34.31	34.90	35.49	36.08	
1768	260	220	6.8	26.91	27.50	28.09	28.69	29.28	29.87	30.46	31.05	31.64	32.23	
1740	300	260	5.8	24.48	25.07	25.66	26.25	26.84	27.43	28.03	28.62	29.21	29.80	
1700	340	300	5.0	22.58	23.17	23.76	24.35	24.94	25.53	26.12	26.71	27.31	27.90	
1739	370	320	4.7	21.89	22.48	23.07	23.67	24.26	24.85	25.44	26.03	26.62	27.21	
1716	390	340	4.4	21.20	21.79	22.38	22.97	23.56	24.15	24.74	25.33	25.92	26.51	
1677	430	380	3.9	20.06	20.65	21.24	21.83	22.42	23.01	23.60	24.19	24.78	25.37	
1700	500	440	3.4	18.98	19.57	20.16	20.75	21.34	21.93	22.53	23.12	23.71	24.30	
1586	610	560	2.6	17.22	17.81	18.40	18.99	19.58	20.17	20.77	21.36	21.95	22.54	
1650	660	600	2.5	17.07	17.67	18.26	18.85	19.44	20.03	20.62	21.21	21.80	22.39	

1/ 32-foot logs. PNW-41 data are based on scaling in long log lengths by United States Forest Service standards for Douglas-fir.subregion. Volumes so determined are adjusted here to approximate Bureau of Land Management short log scale.

2/ Number represents mix of log lengths as yarded, with 32-foot log considered average.

3/ Distance logs actually travel from choker setting point to landing.

1/ 32-foot logs. PNW-41 data are based on scaling in long log lengths by United States Forest Service standards for Douglas-fir subregion. Volumes so determined are adjusted here to approximate Bureau of Land Management short log scale.  
2/ Number represents mix of log lengths as yarded, with 32-foot log considered average.  
3/ Distance logs actually travel from choker setting point to landing.

GPO 858-081



(3.b.(8))

## 9333.3 - PRODUCTION COSTS

## Schedule 19

Cost And Production Studies

b. Activity - Rigging, Yarding and Loading - Western Oregon  
 (8) Operations - Commercial Thinnings - Yarding With 4-Wheel Skidder

Reference for Cost Table Illustration 2, Table 35

Operating Time for Rubber-tired Skidder YardingDevelopment of Time Components

Regression equations (from PNW-41)

Outrun time empty:

$$Y = 0.8534 + 0.002951D$$

Choker setting time:

$$Y = 1.230 + 0.6952N + 0.002431T_1$$

Skidding time:

$$Y = 0.04807 + 0.003502D - 0.000001096D^2 + 0.001777V_2 + 0.003079T_2$$

Unhooking and decking time:

$$Y = 1.054 + 0.2627N$$

Where:

Y = Time per turn of logs, in minutes

D = Slope distance in feet

N = Number of logs per turn

T<sub>1</sub> = Number of trees per acre before cut

T<sub>2</sub> = Number of trees per acre after cut

V<sub>2</sub> = Volume per turn in board feet, Scribner  
 (long log scale)

(3.b.(8))

9333.3 - PRODUCTION COSTS  
Schedule 19

## Cost And Production Studies

v. Summation equation: For BLM commercial thinning sale conditions, $T_1$ averages 170 and $T_2$ averages 119. In the choker setting time formula, $0.00243INT_1$ then becomes a constant of 0.41327N. In the skidding time formula, $0.003079T_2$ then becomes a constant of 0.36640. Combining all equations with these constants, the summation equation for the complete skidding cycle is:				Yarding Distance in Feet 3/									
Y = $3.55187 + 1.3712N + 0.006453D - 0.000001096D^2 + 0.001777V_2$				Computed Operating Time - Minutes per Turn, Rubber-tired Skidder Yarding									
Vol. per Turn-Bd.Ft. Scrib. Short Log Scale	Vol. Ave. Log 1/ - Bd. Ft. Scribner		No. of 2/ Logs per Turn										
	Short Log Scale	Long Log Scale		50	100	150	200	250	300	350	400	450	500
200	20	20	10.0	17.94	18.25	18.56	18.87	19.16	19.46	19.74	20.02	20.30	20.57
400	40	40	10.0	18.29	18.61	18.92	19.22	19.52	19.81	20.10	20.38	20.66	20.93
700	70	60	10.0	18.65	18.96	19.27	19.58	19.87	20.17	20.45	20.74	21.01	21.28
870	100	80	8.7	17.04	17.35	17.66	17.96	18.26	18.56	18.84	19.12	19.40	19.67
840	120	100	7.0	14.71	15.03	15.34	15.64	15.94	16.23	16.52	16.80	17.08	17.35
812	140	120	5.8	13.06	13.38	13.68	13.99	14.29	14.58	14.87	15.15	15.42	15.69
850	170	140	5.0	11.97	12.29	12.59	12.90	13.20	13.49	13.78	14.06	14.33	14.60
817	190	160	4.3	10.99	11.30	11.61	11.92	12.22	12.51	12.79	13.08	13.35	13.62
836	220	180	3.8	10.30	10.61	10.92	11.22	11.52	11.81	12.10	12.38	12.66	12.93
806	260	220	3.1	9.33	9.65	9.96	10.26	10.56	10.85	11.14	11.42	11.70	11.97
780	300	260	2.6	8.64	8.95	9.26	9.56	9.86	10.16	10.44	10.72	11.00	11.27
782	340	300	2.3	8.25	8.57	8.87	9.18	9.48	9.77	10.06	10.34	10.61	10.88
777	370	320	2.1	7.95	8.26	8.57	8.87	9.17	9.46	9.75	10.03	10.31	10.58
780	390	340	2.0	7.82	8.14	8.45	8.75	9.05	9.34	9.63	9.91	10.18	10.45
774	430	380	1.8	7.56	7.87	8.18	8.48	8.78	9.07	9.36	9.64	9.92	10.19
750	500	440	1.5	7.10	7.42	7.72	8.03	8.33	8.62	8.91	9.19	9.46	9.73
732	610	560	1.2	6.71	7.03	7.33	7.64	7.94	8.23	8.52	8.80	9.07	9.34
726	660	600	1.1	6.55	6.87	7.18	7.48	7.78	8.07	8.36	8.64	8.91	9.18

1/ 32-foot logs. PNW-41 data are based on scaling in long log lengths by United States Forest Service standards for the Douglas-fir subregion. Volumes so determined are adjusted here to approximate Bureau of Land Management short log scale.

2/ Number represents mix of log lengths as yarded, with 32-foot log considered average.

3/ Distance logs actually travel from choker setting point to landing.

GPO 858-051



## 9333.3 - PRODUCTION COSTS

Schedule 19  
Cost and Production Studies

Appendix 1. Page 266

(3.b.(8))

b. Activity Rigging, Yarding and Loading - Western Oregon

(8) Operations Commercial Thinnings - Yarding With 4-Wheel Skidder

Reference for Cost Table Illustration 2, Table 35

Computed Operating Time - Minutes per Turn, Rubber-tired Skidder Yarding (Cont'd.)											
Vol. per Turn-Bd.Ft. Scrib, Short Log Scale	Vol. Ave. Log 1/ - Bd. Ft. Scribner		No. of 2/ Logs per Turn	Yarding Distance in Feet 3/ 550 600 650 700 750 800 850 900 950 1000							
	Short Log Scale	Long Log Scale		550	600	650	700	750	800	850	900 950 1000
200	20	20	10.0	20.84	21.10	21.35	21.60	21.84	22.08	22.31	22.54 22.76 22.97
400	40	40	10.0	21.19	21.45	21.70	21.95	22.20	22.43	22.66	22.89 23.11 23.33
700	70	60	10.0	21.55	21.81	22.06	22.31	22.55	22.79	23.02	23.25 23.47 23.68
870	100	80	8.7	19.93	20.19	20.45	20.70	20.94	21.18	21.41	21.63 21.86 22.07
840	120	100	7.0	17.61	17.87	18.12	18.37	18.62	18.85	19.08	19.31 19.53 19.75
812	140	120	5.8	15.96	16.22	16.47	16.72	16.96	17.20	17.43	17.66 17.88 18.09
850	170	140	5.0	14.87	15.13	15.38	15.63	15.87	16.11	16.34	16.57 16.79 17.00
817	190	160	4.3	13.89	14.15	14.40	14.65	14.89	15.13	15.36	15.59 15.81 16.02
836	220	180	3.8	13.19	13.45	13.71	13.96	14.20	14.44	14.67	14.89 15.12 15.33
806	260	220	3.1	12.23	12.49	12.74	12.99	13.24	13.47	13.70	13.93 14.15 14.37
780	300	260	2.6	11.53	11.79	12.05	12.30	12.54	12.78	13.01	13.23 13.46 13.67
782	340	300	2.3	11.15	11.41	11.66	11.91	12.15	12.39	12.62	12.85 13.07 13.28
777	370	320	2.1	10.84	11.10	11.36	11.60	11.85	12.08	12.32	12.54 12.76 12.98
780	390	340	2.0	10.72	10.98	11.23	11.48	11.72	11.96	12.19	12.42 12.64 12.86
774	430	380	1.8	10.45	10.71	10.97	11.21	11.46	11.69	11.93	12.15 12.37 12.59
750	500	440	1.5	10.00	10.26	10.51	10.76	11.00	11.24	11.47	11.70 11.92 12.13
732	610	560	1.2	9.61	9.87	10.12	10.37	10.61	10.85	11.08	11.31 11.53 11.74
726	660	600	1.1	9.45	9.71	9.96	10.21	10.45	10.69	10.92	11.15 11.37 11.59

1/ 32-foot logs. PNW-41 data are based on scaling in long log lengths by United States Forest Service standards for the Douglas-fir subregion. Volumes so determined are adjusted here to approximate Bureau of Land Management short log scale.

2/ Number represents mix of log lengths as yarded, with 32-foot log considered average.

3/ Distance logs actually travel from choker setting point to landing.

GPO 858-051



9333.3 - PRODUCTION COSTS

Schedule 19

Cost And Production Studies

b. Activity - Rigging, Yarding, Loading - Western Oregon

(9) Operations - Commercial Thinnings - Loading

Reference for Cost Table Illustration 2, Table 36

Operating Time and Cost for Light Yarder-Loader (Cold Deck Loading)  
Minutes per MBF Gross Volume

Vol. Avg. Log Bd. Ft. Scribner 1/ 16' Log      32' Log		No. 32' Logs/MBF	Direct 2/ Loading Time per 32' Log -Minutes	Direct Loading Time Per MBF -Minutes	Fixed 3/ Loading Time Per MBF -Minutes	Total Loading Time Per MBF -Minutes
10	20	50.0	1.494	74.70	3.59	78.29
20	40	25.0	1.494	37.35	3.59	40.94
35	70	14.3	1.494	21.36	3.59	24.95
50	100	10.0	1.494	14.94	3.59	18.53
60	120	8.3	1.494	12.40	3.59	15.99
70	140	7.1	1.494	10.61	3.59	14.20
85	170	5.9	1.494	8.81	3.59	12.40
95	190	5.3	1.494	7.92	3.59	11.51
110	220	4.5	1.494	6.72	3.59	10.31
125	250	4.0	1.494	5.98	3.59	9.57
130	260	3.8	1.494	5.68	3.59	9.27
140	280	3.6	1.494	5.38	3.59	8.97
150	300	3.3	1.494	4.93	3.59	8.52
160	320	3.1	1.494	4.63	3.59	8.22
170	340	2.9	1.494	4.33	3.59	7.92
185	370	2.7	1.494	4.03	3.59	7.62
195	390	2.6	1.494	3.88	3.59	7.47
205	410	2.4	1.494	3.59	3.59	7.18
215	430	2.3	1.494	3.44	3.59	7.03
230	460	2.2	1.494	3.29	3.59	6.88
240	480	2.1	1.494	3.14	3.59	6.73
250	500	2.0	1.494	2.99	3.59	6.58
260	520	1.9	1.494	2.84	3.59	6.43
270	540	1.9	1.494	2.84	3.59	6.43
280	560	1.8	1.494	2.69	3.59	6.28
290	580	1.7	1.494	2.54	3.59	6.13
295	590	1.7	1.494	2.54	3.59	6.13
305	610	1.6	1.494	2.39	3.59	5.98
320	640	1.6	1.494	2.39	3.59	5.98
330	660	1.5	1.494	2.24	3.59	5.83



9333.3 - PRODUCTION COSTS  
Schedule 19

Cost And Production Studies

1/ Short log scale

2/ From PNW-41: Direct loading time/long log = 1.22 minutes;  
loading delay factor = 1.123; adjusted direct  
loading time = 1.494 minutes

Net log weight (from Table 5, 9333.33A.) 50,000 lbs.

Scribner Dec. C wt. equivalent per MBF (from BLM Thinning Handbook) - 11,000 lbs.

Then:  $50,000 \text{ lbs.} \div 11,000 \text{ lbs./M} = 4.545 \text{ MBF per load}$

3/ From PNW-41: Fixed time per contractor's load - 16.3 minutes;

Then:  $16.3 \text{ min.} \div 4.545 \text{ M} = 3.59 \text{ minutes per MBF, fixed loading time}$   
(Fixed loading time is for positioning, coupling and binding the trailer)

9333.3 - PRODUCTION COSTS

Schedule 19

Cost And Production Studies

c. Activity - Road Construction and Maintenance  
(1) Operations - Grubbing

Reference for Cost Table Illustration 4, Table 3

Source of Data. Grubbing costs are based upon the removal of 428 stumps from 24" to 88" in diameter by a variety of methods, including conventional blasting, splitting with tractor attachment, and under-cutting.

Cost of Materials (used in removal by blasting)<sup>3/</sup>

Dynamite (stumping) - 1-1/4" x 8" @ \$0.084/stick

Caps (electric), with 12' lead @ \$0.030/cap

Total Grubbing Costs 1/2/ 3/

D.B.H.	Total Cost per Stump	D.B.H.	Total Cost Per Stump
20	\$0.124	64	\$20.576
24	1.984	68	22.436
28	3.843	72	24.296
32	5.703	76	26.155
36	7.562	80	28.014
40	9.421	84	29.873
44	11.280	88	31.732
48	13.139	92	33.592
52	14.999	96	35.451
56	16.858	100	37.310
60	18.717		

1/ Cost rather than time was analyzed by d.b.h. because different methods were used to grub stumps; cost was the only common denominator.

2/ Regression equation:

$$\hat{Y} = \bar{y} + b(X_i - \bar{x})$$

$$= a + bX_i \text{ (where } a = \bar{y} - b\bar{x}\text{), in which}$$

$\hat{Y}$  = Cost per stump by d.b.h..class

$\bar{y}$  = Average cost per stump, all stumps

$b$  = Regression coefficient (0.4128)

$X_i$  = Individual stump diameter (each observation)

$\bar{x}$  = Average stump diameter, all stumps

3/ The study costs of 1965-66 have been adjusted upward to reflect current wage, machine and material costs.



## 9333.3 - PRODUCTION COSTS

(3.c.(2))

## Schedule 19

Cost And Production StudiesC. Activity - Road Construction and Maintenance(2) Operations - ExcavationReference for Cost Table Illustration 4, Tables 4, 5, 6, 7, 8 and 9

Data Source. Production studies included a range of tractor mounted dozers; however, they have been converted to costs based upon the machine rates of the Caterpillar D8H dozer with ripper as the standard machine. Thus, the cost tables are limited to unit costs. Production rates per minute are omitted.

The typical cross section in the recent studies was unbalanced. On the more gentle side slopes, and on side slopes over 60%, the cross section was a full bench or nearly so. Most excavated material was sidecast and drifted no more than 125 feet. There was no significant relationship between percent side slope and cost per yard. No allowance was made for curve widening excavation.

(a) Common Excavation

Tractor Excavation Cost. Eight road construction studies serve as a basis for cost. Time data have been combined with current operation costs.

Total cost - \$13,821.00 ÷ 89,777 cu. yds. = Average cost  
of \$0.150/cu.yd.

Range of typical costs: \$0.11 - \$0.21/cu. yd.

(3.c.(2))

9333.3 - PRODUCTION COSTS  
Schedule 19

Cost And Production Studies

Common Excavation - Cubic yards per station

% Side Slope	14' Subgrade (10' Usable Width)		20' Subgrade (12' Usable Width)	
	Ave. Center Line Cut	Cubic Yards/ Station	Ave. Center Line Cut	Cubic Yards/ Station
0	---	93	---	130
10	1.0	93	1.2	130
20	1.5	147	2.5	309
30	2.0	220	2.5	346
40	2.7	321	3.0	462
50	2.7	370	4.3	617
60	4.3	485	5.0	768
70	5.0	622	7.0	1,088
80	5.7	763	8.0	1,331
90	6.3	907	9.0	1,636
100	7.0	1,133	10.0	2,045

Common Excavation - Cubic Yards per Turnout 1/

% Side Slope	14' Subgrade (10' Usable Width)			20' Subgrade (12' Usable Width)		
	Ave. Ctr. Line Cut	Cu. Yds./ Station	Cu. Yds./ Turnout	Ave. Ctr. Line Cut	Cu. Yds./ Station	Cu. Yds./ Turnout
0	---	37	28	---	51	77
10	1.3	37	28	1.7	51	77
20	2.0	42	32	3.0	69	104
30	2.7	65	49	3.1	79	119
40	3.5	71	53	4.0	138	207
50	4.7	115	86	5.7	142	213
60	8.0	414	311	10.1	706	1,059
70	12.0	898	674	14.0	1,145	1,718
80	13.2	1,097	822	16.0	1,436	2,154
90	14.8	1,376	1,032	18.0	1,770	2,655
100	17.0	1,660	1,245	20.0	2,085	3,128

1/ Turnout yardage is in addition to excavation for the regular road prism.



9333.3 - PRODUCTION COSTS  
Schedule 19

(3.c.(2))

Cost And Production StudiesC. Activity - Road Construction and MaintenanceOperations - ExcavationReference for Cost Table Illustration 4, Tables 4, 5, 6, 7, 8, and 9(b) Rock Excavation

Costs. Costs are based upon five time studies, including a total of 13,928 cubic yards. The material excavated varied from sandstone to basalt. Costs cover the expense of ripping or drilling and shooting and moving loosened material.

Cost per Yard. The cost per yard ranges from \$0.84 to \$3.23. Cost appears to be more closely correlated with the amount of rock excavation than with type of rock. The relationship is inverse; i.e., larger volumes may be excavated at smaller unit costs.

Total cost \$17,689      13,928 cu. yds. = \$1.27/cu. yd.

Rock Excavation - Cubic Yards per Station

% Side Slope	14' Subgrade (10' Usable Width)		20' Subgrade (12' Usable Width)	
	Ave. Center Line Cut	Cubic Yards/ Station	Ave. Center Line Cut	Cubic Yards Station
0	---	64	---	74
10	1.0	64	0.7	74
20	1.0	86	1.0	119
30	1.5	96	1.5	206
40	2.3	194	2.0	276
50	2.6	263	4.3	509
60	4.2	393	5.0	597
70	4.9	473	7.0	861
80	5.7	569	8.0	990
90	6.2	638	9.0	1,180
100	7.0	735	10.0	1,335

(3.c.(2))

## 9333.3 - PRODUCTION COSTS

## Schedule 19

Cost And Production StudiesRock Excavation - Cubic Yards per Turnout

% Side Slope	14' Subgrade (10' Usable Width)			20 Ft. Subgrade (12' Usable Width)		
	Ave. Ctr. Line Cut	Cu. Yds./ Station	Cu. Yds./ Turnout	Ave. Ctr. Line Cut	Cu. Yds./ Station	Cu. Yds./ Turnout
0	---	34	26	---	83	125
10	1.3	34	26	1.0	83	125
20	2.0	70	53	2.5	122	183
30	2.8	134	101	3.1	127	191
40	3.5	95	71	4.0	159	239
50	4.7	141	106	5.6	139	209
60	8.0	340	255	10.1	581	872
70	12.0	678	509	14.0	875	1,313
80	13.8	784	588	16.0	1,067	1,600
90	15.0	936	702	18.0	1,197	1,796
100	17.0	1,107	830	20.0	1,399	2,099

Drift Factors - Allowance for Drift Beyond 100 FeetDetermining Percentage Cost Increase

<u>Factor 1/</u>	<u>Average Drift Distance in Feet</u>	<u>Cost Increase in Per Cent 2/</u>
7.5	100	0
5.3	150	42
4.2	200	79
3.3	250	127
2.7	300	178
2.4	350	213

1/ From Caterpillar Performance Handbook - bulldozer production, October 1966. Based on distance from mass center of cut to mass center of fill, using 8S blade.

2/ Percentages apply to the tractor cost only; not applicable to drilling expense, blasting expense, or cost of explosives.



(3.c.(3))

9333.3 - PRODUCTION COSTS  
Schedule 19

Cost And Production Studies

C. Activity - Road Construction and Maintenance

(3) Operations - Excavation and End Haul With Wheel Scraper

Reference for Cost Table Illustration 4, Table 10

(a) Computation of Cycle Times and Production Rates

Wheel scraper operating at 100% efficiency on 6% effective grade, pay load 16 bank cu. yds.: 1/

<u>Haul Distance</u> (One Way) <u>Feet</u>	<u>Cycle</u> (Round Trip) <u>Time - Minutes</u>	<u>Bank Cu. Yds.</u> <u>Per Hour</u>
500	2.22	433
1,000	2.86	335
1,500	3.48	276
2,000	4.08	236
2,500	4.67	206

Correction for wheel scraper production at 35% efficiency.

<u>Haul Distance</u> (One Way) <u>Feet</u>	<u>Corrected Cycle</u> <u>Time - Minutes</u>	<u>No. of</u> <u>Cycles x 1.8 =</u> <u>Per Hr. Min.</u>	<u>Tractor</u> <u>Oper. Time</u> <u>Min./Hr.</u>	<u>Corrected</u> <u>Production</u> <u>Bank Cu. Yds.</u> <u>Per Hr.</u>
500	6.34	9.46	17.03	151
1,000	8.17	7.34	13.21	117
1,500	9.94	6.04	10.87	97
2,000	11.66	5.15	9.27	82
2,500	13.34	4.50	8.10	72

(3.c.(3))

9333.3 - PRODUCTION COSTS  
(Schedule 19)Cost and Production Studies(b) Computation of D8H Pusher Corrected Rates

Haul Distance (One Way) Feet	Fixed Cost Per Hour	Operating Time Min./Hr.	$\$0.24 \times$ Per Minute	Corrected Operating Cost/Hr.	Corrected Total Machine Rate
500	\$9.41	17.03		\$4.09	\$13.50
1,000	9.41	13.21		3.17	12.58
1,500	9.41	10.87		2.61	12.02
2,000	9.41	9.27		2.22	11.63
2,500	9.41	8.10		1.94	11.35

1/ Data from Caterpillar Performance Handbook(c) Determining Cost per Yard

Hauling Distance (One Way) Feet	HOURLY COST						Hourly Prod'n Cubic Yards
	D8H Pusher Total Machine Cost	Wheel Scraper (Rental Rate) Cost	Total Wages	Subtotal Machine and Wage Cost	10% Gen. & Admin. Cost	Total Hourly Cost	
500	\$13.50	\$43.63	\$18.80	\$75.93	\$3.23	\$79.16	151
1,000	12.58	43.63	18.80	75.01	3.14	78.15	117
1,500	12.02	43.63	18.80	74.45	3.08	77.53	97
2,000	11.63	43.63	18.80	74.06	3.04	77.10	82
2,500	11.35	43.63	18.80	73.78	3.01	76.79	72



## 9333.3 - PRODUCTION COSTS

(3.c.(4))

## Schedule 19

Cost And Production StudiesC. Activity - Road Construction and Maintenance(4) Operations - Shovel Excavation - 3/4 Yard ShovelReference for Cost Table Illustration 4, Table 11Correction for 3/4 Yard Shovel Production at 53% Efficiency

Type of Excavation	Production at 100% Efficiency Cu. Yds./Hour 1/	Correction Factor	Production at 53% Efficiency Cu. Yds./Hour
Easy Digging (Common earth)	135	0.53	72
Rock, Well Blasted	95	0.53	50
Common Excavation w/Rock & Roots	80	0.53	42
Rock, Poorly Blasted	50	0.53	27

Determining Cost per Yard

Excavation	Total Hourly Cost	Hourly Production 53% Efficiency Cu. Yds.	= Cost per Cu. Yd.
Easy Digging (Common earth)	\$34.40	72	\$0.478
Rock, Well Blasted	34.40	50	0.688
Common Excavation w/Rock & Roots	34.40	42	0.819
Rock, Poorly Blasted	34.40	27	1.274

1/ From Caterpillar Performance Handbook - based upon bank cubic  
yard measure.

9333.3 - PRODUCTION COSTS  
Schedule 19

Cost and Production Studies

C. Activity - Road Construction and Maintenance

(5) Operations - Galvanized Corrugated Metal Culverts

Reference for Cost Table Illustration 4, Tables 13, 14, 15, 16 and 17  
General

(a) Size. Costs for 8" through 21" sizes are for helically corrugated pipe. Costs for large structural plate pipe or pipe arches can be computed; for these it is advisable to use manufacturers' prices current at the time of appraisal.

(b) Gage. Gages shown are those normally sold. If different gages will be used, costs must be adjusted accordingly.

(c) Current Delivered Price. These prices are based upon discounted quotations obtained from manufacturers and represent the cost of culvert delivered to the job. Discount for riveted and helically corrugated culvert is 25 percent; discount for large structural plate culvert is 10 percent. These discounts are for substantial orders of 10,000 pounds or more. Prices will be higher for orders smaller than this. Manufacturers' quotations should be used for the smaller orders.

(d) Connecting Bands. Cost is based upon one band for 36 feet of pipe.

(e) Shop Elliptical Forming. This cost is included in the "Installed Cost per Lineal Foot" for all riveted round pipe 36" in diameter and larger.

(f) Installation. Installation costs were originally suggested by manufacturers. The suggested costs have been adjusted upwards to reflect increased machine and labor costs. Installation costs cover erection of structural plate culverts and "lay, line, and join" operations on standard riveted culverts. These costs are included in the "Installed Cost per Lineal Foot."

(g) Excavation and Backfill. Volume was computed by allowing one foot on each side and one and one-half times the pipe height for standard riveted culverts, and two times the width and one and one-half times the height for structural plate culverts. The cost allowance of \$4.73 per cubic yard was developed from recent Bureau of Public Roads and Oregon State Highway Commission bid tabulations. The low bid average has been adjusted to exclude profit.



9333.3 - PRODUCTION COSTS  
Schedule 19

Cost and Production Studies

When it is known that more or less volume than shown in the tables will be required, an adjustment should be made accordingly. Costs of excavation and backfill as computed above are included in the "Installed Cost per Lineal Foot."

(h) Additional Cost to Wire Strut Shop Formed Pipe. This is the manufacturer's charge for wire strutting only.

(i) Wood Strutting. Strutting costs are based upon the use of two 4" x 4" upper sills, one 4" x 4" strut every five feet, one 4" x 4" x 12" compression block for each strut and one 4" x 4" lower sill, plus the cost of labor to install struts.

(j) Beveling. The costs of beveling are based upon the expense of cuts which will give a 2:1 or less straight or step bevel.

Costs are for beveling both ends of the culverts and cover cutting charges only, without regard for material removed in beveling. Thus, culvert costs should be figured for the entire length of uncut material between bevel ends.

(k) Installed Price per Foot. This includes all other costs except strutting and beveling, and represents the normal allowances for culvert installation. When strutting or beveling are required, when gage is different or more or less structural excavation occurs, the "Installed Cost per Lineal Foot" must be adjusted accordingly.

9333.3 - PRODUCTION COSTS  
(Schedule 19)

Cost And Production Studies

C. Activity - Road Construction and Maintenance

Operations - Galvanized Corrugated Metal Culverts

Reference for Cost Table Illustration 4, Tables 14, 15, 16 and 17

Standard Riveted Round Pipe

(a) Size	(b) Gage	(c) 1/ Current Delivered Price	(d) Connec- 2/ ting Bands Based on 36' Pipe Length	(e) Shop Elliptical Forming	(f) Instal- lation	(g) Excavation & Backfill	
						Cu. Yds.	Cost \$4.73/Ydl.
8"	16	\$ 1.41	.03	--	.33	.11	\$ .52
10"	16	1.79	.05	--	.42	.13	.61
12"	16	2.45	.07	--	.51	.16	.76
15"	16	2.84	.12	--	.63	.23	1.09
18"	16	3.27	.14	--	.74	.29	1.37
21"	16	3.72	.15	--	.89	.36	1.70
24"	14	5.13	.21	--	.99	.44	2.08
30"	14	6.24	.26	--	1.24	.62	2.93
36"	12	10.51	.43	1.02	1.50	.83	3.93
42"	12	12.52	.53	.80	3.51	1.07	5.06
48"	12	14.11	.59	.80	4.02	1.33	6.29
54"	12	18.03	.75	1.04	4.47	1.62	7.66
60"	10	24.51	2.04	1.29	4.98	1.94	9.18
66"	10	26.80	2.24	1.55	5.46	2.29	10.83
72"	10	29.18	2.44	1.80	5.97	2.67	12.63
78"	8	40.72	3.40	2.05	6.45	3.07	14.52
84"	8	43.96	3.67	2.30	6.98	3.50	16.56
90"	8	47.09	3.93	2.54	7.47	3.93	18.59
96"	8	50.33	4.20	2.79	7.96	4.44	21.00

- 1/ 8" to 18" diameter pipe - 7" band - same price as 1.0 ft. of pipe  
 21" to 54" diameter pipe - 12" band - same price as 1.5 ft. of pipe  
 pipe 60" and over - 24" band - same price as 3.0 ft. of pipe

2/ Strutting and beveling costs are not included.

Columns (c), (d), and (e) - 1972 prices adjusted by current discount of 1.172.  
 Excavation and Installation - Based on D8H and operator - factor of 1.126.  
 Beveling and strutting based on wage increase factor of 1.08.



9333.3 - PRODUCTION COSTS

(Schedule 19)

Cost and Production Studies

Standard Riveted Pipe Arch						
(a)	(b)	(c)	(d)	(e)	(f)	
Size	Gage	Current Delivered Price	Connecting Bands Based on 36' Pipe Length 1/	Installation	Excavation & Backfill	
					Cu. Yds.	Cost @ \$4.73
17" x 13"	16	\$ 3.05	\$ 0.13	\$ 0.61	.18	\$ 0.85
21" x 15"	16	3.50	0.14	0.73	.23	1.09
24" x 18"	16	3.96	0.16	0.83	.30	1.42
28" x 20"	14	5.39	0.22	1.13	.37	1.75
35" x 24"	14	6.52	0.27	1.19	.51	2.41
42" x 29"	12	10.86	0.46	1.43	.70	3.31
49" x 33"	12	12.90	0.54	3.32	.88	4.16
57" x 38"	12	14.56	0.81	3.84	1.14	5.39
64" x 43"	12	18.52	1.03	4.31	1.37	6.48
71" x 47"	10	25.08	1.39	4.77	1.63	7.71

1/ Sizes 18" to 50" - 12" band - same price as 1.5 ft. of arch.  
 Sizes 58" and over - 24" band - same price as 2.0 ft. of arch.

Columns (c) and (d) - 1972 price list adjusted by current discount =  
 1.172

Columns (e) and (f) based on D8H - see calculation for grubbing =  
 1.126

9333.3 - PRODUCTION COSTS  
(Schedule 19)

Cost And Production Studies

C. Activity - Road Construction and Maintenance

Operations - Galvanized Corrugated Metal Culverts

Reference for Cost Table Illustration 4, Tables 14, 15, 16 and 17

Structural Plate Round Pipe

(a) Size	(b) Gage	(c) Current Delivered Price	(d) Installation	(e) Excavation & Backfill	
				Cu. Yds.	Cost \$4.73/yd.
8'	12	\$54.43	\$19.00	7.1	\$33.50
9'	10	68.49	19.00	9.0	42.50
10'	10	73.91	19.00	11.1	52.50
11'	10	83.70	27.50	13.4	63.50
12'	10	91.33	27.50	16.0	75.50

Structural Plate Pipe Arch

6'1" x 4'7"	12	\$ 40.50	\$15.00	3.09	\$14.50
6'9" x 4'11"	12	42.64	15.00	3.69	17.50
7'3" x 5'3"	10	52.00	18.00	4.23	20.00
7'11" x 5'7"	10	58.07	18.00	4.91	23.00
8'7" x 5'11"	10	64.18	21.00	5.64	27.00
9'4" x 6'3"	10	66.85	21.00	6.48	30.50
9'9" x 6'7"	10	71.40	21.00	7.13	33.50
10'8" x 6'11"	8	81.56	21.00	8.20	39.00
11'5" x 7'3"	8	84.71	21.00	9.20	43.50
11'10" x 7'7"	8	90.83	24.00	9.96	47.00
12'4" x 7'9"	8	92.99	24.00	10.61	50.00
13'11" x 8'7"	7	110.90	24.00	12.44	58.50



## 9333.3 - PRODUCTION COSTS

(3.d.(1))

(Schedule 19)

Cost And Production Studies

- d. Activity - Fire Protection and Hazard Reduction
- (1) Operations - Slash Burning

Reference for Cost Table Illustration 5, Table 3

Acres	Man Hours per Acre <u>1/</u>	Total Cost per Acre <u>2/</u> <u>3/</u>
10	3.286	\$26.25
15	2.714	21.75
20	2.353	19.00
25	2.121	17.25
30	1.966	16.00
40	1.780	14.50
60	1.583	13.00
100	1.298	10.75
150	.952	8.00
200	.607	5.50

1/ Regression equation:

Y = Man hours per acre

$$Y = 1.98876 - .00691X_1 + 3.71405X_2$$

 $X_1$  = Acres

$X_2$  =  $e^{-.1}$  acres, where, e is the base of natural logarithms  
and is equal to 2.7182818+.

2/ Total cost is based on a weighted average wage rate of \$7.80  
per hour.

3/ Total cost includes \$0.65 per acre for tractor, torch fuel  
and tools.

Range of Conditions on Study Areas

- (1) All clear cut - 63% high-lead and 37% tractor log.
- (2) Slope - 0% to 70+%
- (3) Aspect
  - (a) 34% North
  - (b) 26% East
  - (c) 25% South
  - (d) 15% West
- (4) Clear cut acres in sale - 2 to 233 acres
- (5) Per cent recovery - 58% to 92%
- (6) Slash concentration - light to heavy
- (7) Burning conditions - poor to good
- (8) Volume per acre - 11 MBF to 116 MBF





Appendix II











9333.3 - PRODUCTION COSTS  
(Schedule 19)

APPENDIX II - BASIC DATA

MANUFACTURING COSTS

Table of Contents

	<u>Page</u>
A. Weights by Manufacture - Douglas-fir	1
B. Western Oregon Sawmill	5
1. Cost Development	6
a. Basis for Cost Allocations	6
(1) Depreciation	6
(2) Labor and Manpower	7
(a) Basic Rates	7
(b) Adjustment Factors	7
(3) Other Cost Allocations	10
(4) Selling Expenses	10
b. Direct Labor and Investment Costs	11
(1) Log Pond	11
(2) Sawmill	12
(3) Green Chain	15
(4) Planing Mill	16
(5) Yarding and Loading	18
(6) Chipping System	19
(7) Boiler Room	20
(8) Barker System	21
(9) Dry Kilns	22
(10) General Expenses	23
(11) Direct Labor and Investment Summary	24
c. General, Overhead and Management Expenses	25
2. Cost Summary	27
a. Basic 1966 Cost Summary	27
b. Current 1973 Cost Adjustments	28
c. Plant Facilities	31A
d. Wages and Wage Costs	32
e. Current Plant Operation Costs	33
3. Application of Costs	37
a. General	37
b. Computation of Costs Per M	40
c. Sawing Time	42
(1) Douglas-fir and Hemlock	42
(2) True Firs and Cedars	44
 Sawmill Layout	 45A
Planing Mill	45B
Douglas-fir Sawmill Layout	45C

9333.3 - PRODUCTION COSTS  
(Schedule 19)

	<u>Page</u>
C. Eastern Oregon Sawmill	46
1. Cost Development	47
a. Bases for Cost Allocations	47
(1) Depreciation	47
(2) Labor and Manpower	48
(a) Basic Rates	48
(b) Adjustment Factors	48
(3) Additional Cost Allocations	51
(4) Selling Expense	51
b. Direct Labor and Investment Costs	52
(1) Log Pond	52
(2) Sawmill	53
(3) Green Chain	56
(4) Dry Kilns	57
(5) Dry Sorter	58
(6) Planing Mill	59
(7) Yarding and Loading	61
(8) Boiler Room	62
(9) Barker System	63
(10) General Expenses	65
c. General Overhead and Management Expenses	66
2. Cost Summary	67
a. Basic 1960 Cost Summary	67
b. Current 1973 Cost Adjustments	74
3. Application of Costs to 1973 Base	76
Log Sawing Times	78
Sawmill Times	79
Ponderosa Pine Sawmill	80



9333.3 - PRODUCTION COSTS  
(Schedule 19)

A. WEIGHTS BY MANUFACTURE

The following procedure is used to determine the proportion of end products (lumber and plywood) derived from each Douglas-fir log grade.

The products derived from all timber cut in western Oregon are determined first. These data obtained from Pacific Northwest Forest and Range Experiment Station's computer printout of preliminary 1968 survey of log input for sawmills and plywood mills in western Oregon.

Table #1

<u>Log Usage</u>	<u>Volume Used in 1968</u>	
	<u>Percent</u>	<u>Western Oregon MM Bd. Ft. Scribner</u>
Saw logs	60	4,887
Veneer	<u>40</u>	<u>3,308</u>
	100	8,195 MM

The next step is to determine what portion of the above volume consists of Douglas-fir.

For all 1972 sales sold in western Oregon by the Forest Service and BLM.

Table #2

<u>Forest Service</u>	<u>Douglas-fir</u>	<u>All Species</u>
	1,543,110	2,387,037

9333.3 - PRODUCTION COSTS  
(Schedule 19)

Table #3

<u>Bureau of Land Management</u>	<u>Douglas-fir</u>	<u>All Species</u>
1st half 1972	369,586	453,704
Last half 1972	494,574	610,971
	864,160	1,064,675
	<u>x .90</u>	<u>x .90*</u>
	777,744	958,207
Total BLM and Forest Service	2,320,854	3,345,244
	69.4%	100.0%

Thus, of the total volume listed on Table #1 (volume used in 1968), the following is Douglas-fir:

	<u>Total Volume Used</u> <u>MM Bd. Ft.</u>	<u>Percent</u> <u>Douglas-fir</u>	<u>Total</u> <u>D-fir</u> <u>MM Bd. Ft.</u>
Western Oregon Only	8,195	69.4	5,687

For the year 1972, as reported by the American Plywood Association, letter dated July 3, 1973, the following proportions of all logs peeled in western Oregon consisted of Douglas-fir:

Table #4

<u>Log Mix</u>	<u>1972</u> <u>Total</u>	<u>Adjusted %</u> <u>Excluding</u> <u>Cull P. &amp; WSP</u>
No. 1 Peelers	.6%	.8
No. 2 Peelers	2.3	3.0
No. 3 Peelers	16.0	24.6
Special Mill	12.5	-
No. 2 Sawlogs	40.5	64.4 **
No. 3 Sawlogs	5.6	7.2
Cull Peelers	16.1	-
WSP	6.4	-
	<u>100.0%</u>	<u>100.0%</u>

\* Conversion to long log

\*\* Special mill distribution - 25% to #3 peeler and 75% to #2 saw log



9333.3 - PRODUCTION COSTS  
(Schedule 19)

The percent volumes by log grades is based on BLM ADP summary for calendar year 1972.

Table #5

Douglas-fir Used by Log Grade

<u>Log Grade</u>	<u>BLM Volume 1972</u>	<u>Percent by Grade</u>		<u>Total Volume MMBF Western Oregon</u>
No. 1 Peeler	6,452	.007)		
No. 2 Peeler	36,059	.042)	.049	279
No. 3 Peeler	183,369	.212)		
Special Peeler	29,060	.034)	.246	1,399
No. 2 Sawmill	446,850	.517	.517	2,940
No. 3 Sawmill	<u>162,370</u>	<u>.188</u>	<u>.188</u>	<u>1,069</u>
	864,160	1.000	1.000	5,687

Percent peeled and sawed determination.

Table #6

	<u>Western Oregon (Vol. MM Bd. Ft.)</u>					
	<u>Volumes</u>			<u>Nearest 5 Percent</u>		
	<u>Peeled</u> (1)	<u>Sawn</u> (2)	<u>Total</u> (3)	<u>Peeled</u>	<u>Sawn</u>	<u>Total</u>
No. 1 & No. 2 Peeler	86	193	279	30	70	100
No. 3 Peeler & Special Peeler	560	839	1399	40	60	100
No. 2 Saw Log	1465	1475	2940	50	50	100
No. 3 Saw Log	<u>164</u>	<u>905</u>	<u>1069</u>	15	85	100
	2275	3412	5687	40	60	100

- (1) Proportions from Table #4
- (2) Subtract Col (1) From Col (3)
- (3) From Table #5

9333.3 - PRODUCTION COSTS  
(Schedule 19)

WEIGHTS BY MANUFACTURE  
FOR DOUGLAS-FIR

	<u>No. 1 Peeler</u>	<u>No. 2 Peeler</u>	<u>No. 3 Peeler</u>	<u>Special Peeler</u>	<u>No. 2 Saw Log</u>	<u>No. 3 Saw Log</u>
Peeler	30%	30%	40%	40%	50%	15%
Sawed	70%	70%	60%	60%	50%	85%



9333.3 - PRODUCTION COSTS  
(Schedule 19)

B. WESTERN OREGON SAWMILL

The initial step in developing data to estimate lumber milling costs is to define the manufacturing unit which is to process the timber. The capacity of an "average" or "representative" mill was set out and the type of equipment determined.

The 1964 Directory of the Forest Products Industry and Crow's Buyer's and Sellers Guide were consulted for information on the 8-hour capacity for each plant in western Oregon cutting predominantly Douglas-fir.

Production statistics and types of equipment were analyzed. From analysis it was decided that a representative sawmill would be as follows: It would have a 100 MBF, 8-hour capacity or capable of such production. The head saw would be a single cut band type and the mill would be equipped with a barker, chipper and dry kilns. The available statistics pointed to this type of plant; further, it is felt that the above specifications would be adequate to reach the utilization degree and realization as set up from grade recovery studies used in calculating average log selling values.

It was decided that in order to apply practical milling costs, we should get "on the ground" information on the type and size of equipment and the number of men actually employed at a number of mills having the basic capacity and specifications decided upon.

Twelve mills were selected in various areas in order to get samples covering all of the Douglas-fir growing areas in western Oregon.

9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL

1. Cost Development

a. Bases for Cost Allocations

Milling costs for purposes of this study have been broken down into the following categories:

- Depreciation
- Labor
- Direct supervision
- Payroll overhead
- Maintenance
- Operating expenses (saw, knives, gas, etc.)
- Operating supplies
- Taxes
- Insurance
- General overhead
- Utilities
- Selling expense

The sections from depreciation through insurance will be set out in each applicable division of production including pond, sawmill, green chain, dry kilns, planing mill, yarding and loading, boiler room, barker assembly, chipper assembly, and general expenses. The other sections, i.e., overhead, utilities, selling expense, and management expense will include those costs for the entire operation.

An average of 280 shifts per year was determined by weighting the daily capacity of western Oregon mills producing from 20,000,000 to 50,000,000 yearly. Yearly production obtained from Forest Industries 1964 Yearbook and Buyers Guide; daily capacity obtained from Directory of the Forest Products Industry.

(1) Depreciation as considered herein is the loss of value of the physical property in the mill during the useful life of such property. This loss is replaced from gross revenues before net income is considered available. Depreciation allowances for this mill are calculated using the "straight-line" method. This method provides for depreciation in equal annual amounts during the useful life of the property. Total loss allowed equals cost of new property less salvage value at end of the depreciation period.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

The life of various pieces of equipment is very difficult to secure, even from manufacturers and dealers, so in many cases we use suggested allowances from Internal Revenue Service schedules.

(2) Labor and Manpower

- (a) Basic Rates - Position (Sawmill Crew) rates by sample mills and weighted averages are shown on Chart #1, Basic Wage Rates, effective June 1, 1965. These basic wage rates were obtained from the Western Council of Lumber and Sawmill Workers.

(b) Adjustment Factors

The following statistics (based on 240 working days) have been reported and are reasonably current (1965-66):

<u>Workmen's Benefits</u>		<u>Employer's Contributions</u>	
Health and welfare	\$0.085/hr	Social Security	3.63%
Paid vacations (2 wks)	0.110/hr		
Paid holidays (6)	0.066/hr		
Pension	<u>0.100/hr</u>		
	\$0.361/hr		

To convert workmen's benefits into percent, it was necessary to calculate an average wage from four reporting mills using the manpower for our theoretical mill. This average was calculated at \$2.65 an hour for the combined planing mill and sawmill operations. Workmen's benefits can then be calculated at  $(.361/\text{hr} \div \$2.65) = 13.62\%$ . The above statistics can then be summarized as follows:

Workmen's benefits	13.62%
Employer's contributions	<u>3.63%</u>
	17.25%

The above percentage has been applied where applicable against the basic wage in each major cost breakdown to allow for payroll overhead.

Employer's contributions - unemployment compensation (2.26%) and industrial accident insurance (sawmill 6.02%, planing mill 3.15%), are included under the heading of general plant overhead.

9333.3 - PRODUCTION COSTS  
(Schedule 19)

Chart 1  
Page 1

WESTERN OREGON SAWMILL  
(Cost Development)

BASIC WAGE RATES  
Effective June 1, 1965.

Number	Sawmill Crew	Roseburg Lbr. Co.	Cape Arago	Pope & Talbot	Moore Mill	Average	Weighted Average
1	Slip Man	2.345	2.495	2.455	2.465	2.440	2.440
1	Crane Operator	2.585	--	2.685	2.855	2.710	2.710
1	Log Stacker Operator	3.020	2.630	--	2.600	2.750	2.750
1	Barker Operator	2.730	--	2.740	--	2.735	2.735
1	Scaler	3.095	2.535 LogDeck	2.480 LogDeck	--	2.700	2.700
1	Headband Sawyer	3.855	3.545	3.875 Aut.Set.	3.595	3.720	3.720
1	Headband Offbearer	2.595	2.485	2.585	2.495	2.540	2.540
1	Edger Operator	2.975	3.075	3.005	3.155	3.050	3.050
1	Edging Picker or Offbearer	--	2.435	2.355	2.365	2.385	2.385
1	Trim Saw Operator	2.875	2.880	2.850	2.880	2.870	2.870
1	Trim Saw Spotter	2.545	2.610	2.550	2.515	2.555	2.555
1	Gang Saw Operator	3.135	--	2.810	--	2.970	2.970
1	Gang Separator or Sorter	2.625	--	2.355	--	2.490	2.490
1	Resawyer	2.765	2.795	2.725	2.880	2.790	2.790
1	Resaw Table Helper	2.545	--	2.455	2.425	2.475	2.475
1	Chipper Operator	2.465	--	2.455	--	2.460	2.460
1	Head Filer	--	3.635	3.645	3.720	3.665	3.665
1	Filer Helper	--	2.850 Helper	2.685 Helper	2.685 Helper	2.740	2.740
1	Cleanup Man (Common labor)	2.345	2.360	2.355	2.365	2.355	2.355
-	Oiler	2.440	2.645	2.525	2.525	--	--
-	Millwright	3.025	2.835	3.030	2.780	--	--
-	Millwright Helper	2.595	--	--	--	--	--
5	Greenchain Pullers	2.440	2.450	2.455	2.420	2.440	12.200
1	Greenchain Marker	2.845	2.725	2.655	2.810	2.760	2.760
1	Mech. Stacking Mach. Opr. (Sticking)	2.595	--	--	--	2.595	2.595
1	Dry Kiln & Boiler Operator	2.795	2.725	2.610	--	2.710	2.710
1	Planer Feeder	2.570	2.690	--	2.670	2.640	2.640
1	Planer Man (Set-up)	3.025	--	2.760 Setup	--	2.890	2.890
1	Trimmerman (Planing)	2.545	2.655	2.500	2.510	2.550 *	2.550
1	Hula Saw Operator (Retrim)	--	--	--	2.510 Use trim	2.550	2.550
1	Grader (Planing)	3.150	--	2.735	--	2.940	2.940

\* Use this for trimmer feeder on automatic machine.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

Chart 1  
Page 2

WESTERN OREGON SAWMILL  
(Cost Development)

BASIC WAGE RATES Effective June 1, 1965							
Number	Sawmill Crew	Roseburg Lbr. Co.	Cape Arago	Pope & Talbot	Moore Mill	Average	Weighted Average
4	Pullers (Planing)	2.440	2.435	2.430	2.420	2.430	9.720
4	Lumber Car Loader	2.840	--	--	--	2.840	11.360
1	Tallyman (Lumber) Car Loading	2.620	--	2.660	--	2.640	2.640
2	Carrier Drivers	2.570	2.630	2.590	2.600	2.600	5.200
3	Lift Truck Drivers	2.570	2.630	2.590	--	2.600	7.800
1	Watchman	--	2.360	2.355	2.365	2.360	2.360
1	Planer Stamper (need in place of automatic machine)	--	2.435 Stamper	2.355 Stamper	2.415 Stamper	2.400	2.400
1	Cleanup Truck (use for small cat cleanup)	2.440 Tract.	--	2.480	--	2.460	2.460
1	Planer Relief & Cleanup	--	2.405	--	--	2.405	2.405
50 men							132.580 + 50 = \$2.65 Ave. Wage

Moore Mill Retail man - \$2.71/hr. - \$5,420/yr.

9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL  
(Cost Development)

(3) Other Cost Allocations

Except for log stacker, decking shovel, utility cat, carrier, and lift truck expenses, the methods for determining the following items were taken from the Oregon Forest Products Laboratory Information Circular 9, "Cost Estimating for Wood Industries" by L. D. Coolidge and J. R. Pfeiffer:

Direct supervision - 10% of direct labor

Maintenance - 4% of physical plant costs

Operating supplies - .5% of physical plant costs

Taxes - 2% of physical plant costs

Insurance - 1% of physical plant cost

General overhead - 55% of direct labor cost plus 2% of  
the investment in the physical plant cost

Management expenses - 1 to 3 (we will use 2) 2% of the total  
plant investment

The above 55% includes Workmen's Compensation Insurance, or payments to state industrial accident funds - see page 30 of Cost Estimating For Wood Industries.

(4) Selling Expense

The commissions given to wholesalers or others and the discounts allowed for prompt payment are considered in the selling value of the lumber. Since a mill of this size would ship approximately three cars of lumber every day, one man at a salary of about \$9,000 a year should be able to handle the sales department work.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL  
(Cost Development)

b. Direct Labor and Investment Costs

(1) Log Pond

A. Depreciation

	<u>Value</u>	<u>Residual</u>	<u>Life</u>	<u>Yearly Depreciation Allowance</u>	
Excavation	\$ 755.00	-	20 yr	\$ 37.75	
Log Stacker	66,101.00	20%	10,000 hr	10,152.96	
Decking shovel	26,000.00	-	10 yr	2,600.00	
Utility cat	7,998.00	5%	6 yr	1,266.33	
Steel tower and hoist	8,000.00	-	15 yr	533.33	
	<u>\$103,854.00</u>				\$14,590.37

B. Labor

	<u>Basic Wage</u>	<u>Hours</u>	<u>Total Wage</u>	
Scaler	\$2.70	2240	\$6,048.00	
Decking shovel operator	2.71	2240	6,070.40	
Log stacker operator	2.75	2240	6,160.00	
Slip man	2.44	2240	5,465.60	
Utility cat operator	2.46	840	2,066.40	
				\$25,810.40

C. Direct Supervision - 10% of direct labor cost 2,581.04

D. Payroll overhead - 17.25% of direct labor cost 4,452.29

E. Maintenance - 4% of physical plant cost (excavation and hoist)  
plus reported maintenance of deck shovel (including lubrication), utility cat, and log stacker 11,257.20

F. Operating Supplies - .5% of physical plant cost less utility cat, log stacker, and shovel 43.78

G. Taxes  
2% of physical plant cost (less log stacker) 855.06  
Log stacker - 2% of average investment 894.74

H. Insurance  
1% of physical plant cost (less log stacker) 427.53  
Log stacker - 2% of average investment 894.74

I. Operating Expenses - (Fuel and oil) 4,152.00

Total yearly cost - \$65,959.15

9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL  
(Cost Development - Direct Costs)

A. <u>Depreciation</u>	(2) Sawmill		<u>Life</u>	<u>Yearly Depreciation Allowance</u>
	<u>Value</u>	<u>Residual</u>		
Building	\$ 67,200.00	-	50 yr	\$ 1,344.00
Wiring	17,542.00	-	20 yr	877.10
Log Haul - Side Lift				
Skids, chains, etc.	6,373.00	-	15 yr	424.87
Motor and starter	2,378.00	-	17 yr	139.88
Log stop and loader	1,852.00	-	20 yr	92.60
Air nigger	6,197.00	-	20 yr	309.85
Simonson turner	12,687.00	-	20 yr	634.35
Carriage and tracks	27,950.00	10%	20 yr	1,257.75
Electric drive unit and setworks	45,165.00	-	20 yr	2,258.25
Band mill and hous- ing	28,909.00	-	27 yr	1,070.70
Motor and starter	12,591.00	-	22 yr	572.32
Resaw	36,109.00	-	25 yr	1,444.36
Motor and starter	7,381.00	-	22 yr	335.50
Edger	13,164.00	-	25 yr	526.56
Motor and starter (feeder)	3,491.00	-	17 yr	205.35
Saw motor and starter	3,282.00	-	22 yr	149.18
Automatic setworks	8,418.00	-	25 yr	336.72
Outfeed table	4,651.00	-	25 yr	186.04
Trimmer	25,653.00	-	25 yr	1,026.12
Feed motor and starter	2,000.00	-	17 yr	117.65
Saw motor and starter	820.00	-	22 yr	37.27
Chain transfer system				
Motors and starters	16,731.90	-	17 yr	984.23
Chain, sprockets, shafts, etc.	52,253.59	-	10 yr	5,225.36
Supports	10,956.82	-	50 yr	219.14
Live rolls and cases	31,766.00	-	25 yr	1,270.64
Motors and starters	6,926.00	-	17 yr	407.41
5 Log stops	4,225.00	-	20 yr	211.25
Refuse drop out	2,918.13	-	10 yr	291.81
Lift skid and air cylinder	2,080.12	-	20 yr	104.01
Timber slide	830.00	-	20 yr	41.50
Bridge crane way	1,550.00	-	50 yr	31.00
Bridge crane	3,500.00	-	20 yr	175.00



9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL  
(Cost Development - Direct Costs)

9331.1  
Page 88  
February 1966

Sawmill (contd.)

A. Depreciation (contd.)

	<u>Value</u>	<u>Residual</u>	<u>Life</u>	<u>Yearly Depreciation Allowance</u>	
Saw filing equip- ment	14,383.40	-	20 yr	\$ 719.17	
Saw filing equip- ment	3,014.96	-	10 yr	301.50	
Miscellaneous tools and equipment	4,500.00	-	10 yr	450.00	
Welding equipment	879.00	-	20 yr	43.95	
Welding equipment	360.00	-	15 yr	24.00	
Hog	6,782.00	-	17 yr	398.94	
Motor and starter	3,397.00	-	22 yr	154.41	
Cant gang saw	43,407.00	-	27 yr	1,607.67	
Motor and starter	5,222.00	-	22 yr	237.36	
Feed roll motor and starter	3,109.00	-	17 yr	182.88	
Refuse conveyor System:					
Motors and starters	6,033.41	--	17 yr	354.91	
Troughs, drums, shafts, etc.	20,527.00	-	10 yr	2,052.70	
Grid rolls	2,330.00	-	20 yr	116.50	
Air compressor and conduit	9,591.00	-	25 yr	383.64	
Refuse burner	29,500.00	-	20 yr	1,475.00	
Timber deck cut-off saw	4,315.00	-	20 yr	215.75	
	<u>\$624,901.33</u>				\$31,026.15

B. Labor

	<u>Basic Wage</u>	<u>Hours</u>	<u>Total Wage</u>	
Headrig sawyer	\$3.72	2240	\$8,332.80	
Headrig offbearer	2.54	2240	5,689.60	
Edgerman	3.05	2240	6,832.00	
Edging picker	2.385	2240	5,342.40	
Trim saw operator	2.87	2240	6,428.80	
Trim saw spotter	2.555	2240	5,723.20	
Gang saw operator	2.97	2240	6,652.80	
Gang saw sorter	2.49	2240	5,577.60	
Resaw operator	2.79	2240	6,249.60	
Resaw helper	2.475	2240	5,544.00	
Filer	3.665	2240	8,209.60	
Filer helper	2.74	2240	6,137.60	
Watchman	2.36	2240	5,286.40	
Cleanup	2.355	2240	5,275.20	
				\$87,281.60

9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL  
(Cost Development - Direct Costs)

Page 89  
February 1966

Sawmill (contd.)

C. <u>Direct Supervision</u> - 10% of direct labor cost	8,728.16
D. <u>Payroll Overhead</u> - 17.25% of direct labor cost	15,056.08
E. <u>Maintenance</u> - 4% of physical plant cost	24,996.05
F. <u>Operating Supplies</u> - .5% of physical plant cost	3,124.51
G. <u>Taxes</u> - 2% of physical plant cost	12,498.03
H. <u>Insurance</u> - 1% of physical plant cost	6,249.01
I. <u>Operating Expenses</u> - (Saw and hog knife expenses)	<u>12,996.34</u>
Total yearly cost -	\$201,955.93



9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL  
(Cost Development - Direct Costs)

9331.1  
Page 90  
February 1966

(3) Green Chain

A. Depreciation

	<u>Value</u>	<u>Residual</u>	<u>Life</u>	<u>Yearly Depreciation Allowance</u>	
Building	\$10,800.00	-	50 yr	\$ 216.00	
Chain transfer system					
Motor and starter	2,079.00	-	17 yr	122.29	
Chain, bearings, sprockets, etc.	11,203.76	-	10 yr	1,120.88	
Table	6,480.00	-	50 yr	129.60	
	<u>\$30,567.76</u>				\$ 1,588.77

B. Labor

	<u>Basic Wage</u>	<u>Hours</u>	<u>Total Wage</u>	
Marker	\$2.76	2240	\$ 6,182.40	
5 Pullers	2.44	2240	<u>27,328.00</u>	\$33,510.40

C. Direct Supervision - 10% of direct labor cost 3,351.04

D. Payroll Overhead - 17.25% of direct labor cost 5,780.54

E. Maintenance - 4% of physical plant cost 1,222.71

F. Operating Supplies - .5% of physical plant cost 152.84

G. Taxes - 2% of physical plant cost 611.36

H. Insurance - 1% of physical plant cost 305.68

Total yearly cost - \$46,523.34

9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL  
(Cost Development - Direct Costs)

Cost Development by Division of Manufacturing

(4) Planing Mill

A. Depreciation

	<u>Value</u>	<u>Residual</u>	<u>Life</u>	<u>Yearly Depreciation Allowance</u>
Building	\$ 39,825.00	-	50 yr	\$ 796.50
Wiring	6,094.00	-	20 yr	304.70
Tilting unloading hoist	6,761.00	-	20 yr	338.05
Transfer chains and Sticker chain:				
Motor and starter	6,867.90	-	17 yr	403.99
Chain, sprockets, shafts, etc.	25,206.60	-	10 yr	2,520.66
Tables or supports	8,967.50	-	50 yr	179.35
Conveyor belts:				
Motors and starters	1,321.00	-	17 yr	77.71
Frame, belt, sup- porting rolls, etc.	5,479.00	-	20 yr	273.95
Refuse conveyor:				
Motor and starter	862.50	-	17 yr	50.74
Chain, trough, chain return, etc.	14,137.50	-	10 yr	1,413.75
Trimmer	26,464.00	-	25 yr	1,058.56
Saw and feed motors and star- ters	3,644.00	-	17 yr	214.35
Single end printer and waxer	6,273.00	-	25 yr	250.92
Planer and grinding equipment	90,174.00	10%	20 yr	4,057.83
Cutter heads on hand	6,241.00	-	20 yr	312.05
Blower system:				
Fan, piping, etc.	7,289.00	-	20 yr	364.45
Motor	1,904.00	-	22 yr	86.55
Fan and pipe sup- ports	2,798.00	-	30 yr	93.27
Cyclone	1,519.00	-	10 yr	151.90
Retrim saws (hula saw)	10,411.00	-	20 yr	520.55
Electric swede puller	1,853.00	-	18 yr	102.94
	\$274,092.00			\$13,572.77



9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL  
(Cost Development - Direct Costs)

Planing Mill (Contd.)

<u>B. Labor</u>	<u>Basic Wage</u>	<u>Hours</u>	<u>Total Wage</u>	
Planer relief and cleanup man	\$2.405	2240	\$ 5,387.20	
Trimmerman	2.55	2240	5,712.00	
Planer man	2.89	2240	6,473.60	
Planer feeder	2.64	2240	5,913.60	
Hula saw operator	2.55	2240	5,712.00	
Grader	2.94	2240	6,585.60	
4 Pullers	2.43	2240	21,772.80	
Stamper	2.40	2240	<u>5,376.00</u>	\$62,932.80
C. <u>Direct Supervision</u> - 10% of direct labor cost				6,293.28
D. <u>Payroll Overhead</u> - 17.25% of direct labor cost				10,855.91
E. <u>Maintenance</u> - 4% of physical plant cost				10,963.68
F. <u>Operating Supplies</u> - .5% of physical plant cost				1,370.46
G. <u>Taxes</u> - 2% of physical plant cost				5,481.84
H. <u>Insurance</u> - 1% of physical plant cost				2,740.92
I. <u>Operating Expense</u> - (Saw and knife expense)				<u>2,121.28</u>
Total yearly cost -				\$116,332.94

9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL  
(Cost Development - Direct Costs)

(5) Yarding and Loading

A. Depreciation

	<u>Value</u>	<u>Residual</u>	<u>Life</u>	<u>Yearly Depreciation Allowance</u>	
2 carriers	\$ 38,610.00	--	10 yr	\$ 3,861.00	
3 lift trucks	40,993.00	--	10 yr	4,099.30	
Bunks	805.20	--	2 yr	402.60	
Blocks	614.88	--	4 yr	153.72	
Packaging and dry storage building	64,000.00	--	50 yr	1,280.00	
Asphalt paving	27,200.00	--	50 yr	544.00	
Railroad spur	26,400.00	10%	25 yr	950.40	
Dry storage and box car shed portion of combination building	55,575.00	--	50 yr	1,111.50	
	<u>\$254,198.08</u>				\$ 12,402.52

B. Labor

	<u>Basic Wage</u>	<u>Hours</u>	<u>Total Wage</u>	
Tallyman	\$2.64	2240	\$ 5,913.60	
4 Car loaders	2.84	2240	25,446.40	
2 carrier drivers	2.60	2240	11,648.00	
3 lift truck drivers	2.60	2240	17,472.00	
				60,480.00

C. Direct Supervision - 10% direct labor cost 6,048.00

D. Payroll Overhead - 17.25% of direct labor cost 10,432.80

E. Operating Supplies - .5% of physical plant cost (less carriers  
and lift trucks) 872.98

F. Taxes - 2% of physical plant cost 5,083.96

G. Insurance - 1% of physical plant cost 2,541.98

H. Maintenance - 4% of physical plant cost (bunks, blocks  
buildings, paving - \$148,195.08 x .04) - \$ 5,927.80  
Carriers and lift trucks, 2240 hr @ \$6.80/hr - 15,232.00  
21,159.80

I. Operating Expenses - (Fuel and lubrication - \$3.50/hr  
x 2240 hr) 7,840.00

Total yearly cost \$126,862.04



9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL  
(Cost Development - Direct Costs)

(6) Chipping System

A. <u>Depreciation</u>					Yearly Depreciation Allowance
	<u>Value</u>	<u>Residual</u>	<u>Life</u>		
Entire chipping and car loading system	\$61,959.00	--	14.8 yr	\$ 4,186.42	\$ 4,186.42
B. <u>Labor</u>		<u>Basic Wage</u>	<u>Hours</u>	<u>Total Wage</u>	
Chipper operator		\$2.46	2240	\$ 5,510.40	5,510.40
C. <u>Direct Supervision</u> - 10% of direct labor cost					551.04
D. <u>Payroll Overhead</u> - 17.25% of direct labor cost					950.54
E. <u>Operating Supplies</u> - .5% of physical plant cost					309.80
F. <u>Taxes</u> - 2% of physical plant cost					1,239.18
G. <u>Insurance</u> - 1% of physical plant cost					619.59
H. <u>Operating Expense</u> (knife expense)					<u>1,531.20</u>
Total Yearly cost -					\$14,898.17

9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL  
(Cost Development - Direct Costs)

(7) Boiler Room (waste wood fired)

<u>A. Depreciation</u>					Yearly
	<u>Value</u>	<u>Residual</u>	<u>Life</u>	<u>Depreciation</u>	<u>Allowance</u>
Boiler enclosure and walk ways	\$ 4,000.00	--	50 yr	\$ 80.00	
Boilers and all equipment	40,350.00	--	25 yr	1,614.00	
Fuel storage bin	16,700.00	--	50 yr	334.00	
Steam pipe and condensate return	2,200.00	--	25 yr	88.00	
Fuel conveyor:					
Motors and starters	1,725.00	--	17 yr	101.47	
Chains, sprockets, etc.	14,932.00	--	10 yr	1,493.20	
Trough and supports	7,823.00	--	50 yr	156.46	
	<u>\$87,730.00</u>				\$ 3,867.13
<u>B. Labor</u>					
		<u>Basic Wage</u>	<u>Hours</u>	<u>Total Wage</u>	
Dry kiln and boiler operator		\$2.71	1120	\$3,035.20	3,035.20
<u>C. Direct Supervision</u> - 10% of direct labor cost					303.52
<u>D. Payroll Overhead</u> - 17.25% of direct labor cost					523.57
<u>E. Maintenance</u> - From Larry Wellons Company					1,000.00
<u>F. Operating Supplies</u> - .5% of physical plant cost					438.65
<u>G. Taxes</u> - 2% of physical plant cost					1,754.60
<u>H. Insurance</u> - 1% of physical plant cost					<u>877.30</u>
Total yearly cost -					\$11,799.97



9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL  
(Cost Development - Direct Costs)

(8) Barker System

A. <u>Depreciation</u>					Yearly Depreciation Allowance
	<u>Value</u>	<u>Residual</u>	<u>Life</u>		
Barker assembly	\$176,947.50	--	16.6 yr	\$10,659.49	
Refuse conveyor:					
Motors and starters	1,725.00	--	17 yr	101.47	
Supports, chain, trough, etc.	16,635.00	--	10 yr	1,663.50	
Log deck cut-off saw	2,370.00	--	15 yr	158.00	
	<u>\$197,677.50</u>				\$12,582.46
B. <u>Labor</u>		<u>Basic Wage</u>	<u>Hours</u>	<u>Total Wage</u>	
Barker operator		\$2.735	2240	<u>\$6,126.40</u>	6,126.40
C. <u>Direct Supervision</u> - 10% of direct labor costs					612.64
D. <u>Payroll Overhead</u> - 17.25% of direct labor costs					1,056.80
E. <u>Operating Supplies</u> - .5% of physical plant cost					988.39
F. <u>Taxes</u> - 2% of physical plant cost					3,953.55
G. <u>Insurance</u> - 1% of physical plant cost					1,976.78
H. <u>Operating Expenses</u> (replace chain saw chains)					<u>480.00</u>
Total yearly cost =					\$27,777.02

9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL  
(Cost Development - Direct Costs)

(9) Dry Kilns

A. <u>Depreciation</u>		Yearly Depreciation Allowance		
	<u>Value</u>	<u>Residual</u>	<u>Life</u>	
Stickers	\$ 3,352.94	-	5 yr	\$ 670.59
Cooling or drying shed	7,875.00	-	50 yr	157.50
Package stacking equipment	38,721.48	-	20 yr	1,936.07
Motors and Starters	5,001.10	-	17 yr	294.18
Dry kiln equipment	62,167.75	-	23 yr	2,702.95
Mechanical stacker building	6,000.00	-	50 yr	120.00
Dry kiln building	33,210.00	-	40 yr	830.25
	<u>\$156,328.27</u>			\$ 6,711.54
B. <u>Labor</u>		<u>Basic Wage</u>	<u>Hours</u>	<u>Total Wage</u>
Boiler and dry kiln operator		\$2.71	1,120	\$3,035.20
Mechanical stacking machine operator		2.595	2,240	<u>5,812.80</u>
				8,848.00
C. <u>Direct Supervision</u> - 10% of direct labor cost				884.80
D. <u>Payroll Overhead</u> - 17.25% of direct labor cost				1,526.28
E. <u>Maintenance</u> - 4% of physical plant cost				6,253.13
F. <u>Operating Supplies</u> - .5% of physical plant cost				781.64
G. <u>Taxes</u> - 2% of physical plant cost				3,126.57
H. <u>Insurance</u> - 1% of physical plant cost				1,563.28
Total yearly cost -				\$29,695.24



9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL  
(Cost Development - Direct Costs)

9331.1  
Page 98

(10) General Expenses

A. Depreciation

	<u>Value</u>	<u>Residual</u>	<u>Life</u>	<u>Yearly Depreciation Allowance</u>	
Primary water piping - plant	\$ 6,800.00	-	25 yr	\$ 272.00	
Plumbing, sewage pipe, septic tank	2,500.00	-	25 yr	100.00	
Primary wiring to all buildings (includes yard lighting)	24,000.00	-	20 yr	1,200.00	
Office	<u>16,000.00</u>	-	50 yr	<u>320.00</u>	
	\$49,300.00				\$1,892.00
Land (25 acres - \$325/acre	<u>8,125.00</u>	\$8,125	-	--	
	\$57,425.00				

B. Maintenance - 4% of physical plant cost (excluding land) 1,972.00

C. Operating Supplies - .5% of physical plant cost (excluding land) 246.50

D. Taxes - 2% of physical plant cost (including land) 1,148.50

E. Insurance - 1% of physical plant cost (including land) 574.25

Total yearly cost - \$5,833.25

Average cost per MBF -  $\frac{\$5,833.25}{24,000 \text{ M}}$  - \$0.243

9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL  
(Cost Development - Direct Costs)

(11) Direct Labor and Investment Summary

	<u>Investment in Plant</u>	<u>Direct Labor Costs</u>
Log Pond	\$ 108,854.00	\$ 25,810.40
Sawmill	624,901.33	87,281.60
Green Chain	30,567.76	33,510.40
Planing Mill	274,092.00	62,932.80
Yarding and Loading	254,198.08	60,480.00
Chipping System	61,959.00	5,510.40
Barker	197,677.50	6,126.40
Dry Kiln	156,328.27	8,848.00
Boiler Plant	87,730.00	3,035.20
General Expenses	<u>57,425.00</u>	<u>--</u>
Totals - Incl. Barker and Chip.	\$1,853,732.94	\$293,535.20
Excluding Barker & Chipper -	\$1,594,096.44	281,898.40



9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL  
(Cost Development - Indirect Costs)

c. General, Overhead and Management Expenses

General Overhead - with Barker and Chipper

55% of direct labor costs  $\div$  2% of investment in plant = Total yearly cost

.55 (\$293,535.20)  $\div$  .02 (\$1,853,732.94)

Total yearly cost - \$198,519.02

Utilities

Electricity - 12 months at \$2,925.12 per month

Total yearly cost - \$ 35,101.44

Selling Expense

Salary - one man per year

Total yearly cost - \$ 9,000.00

Management Expense

% of total plant investment

.02 (\$1,853,732.94) -

Total yearly cost - \$ 37,074.66

9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL  
(Cost Development - Indirect Costs)

General Overhead - without Barker and Chipper

55% of direct labor costs + 2% of investment in plant = Total yearly cost

.55 (\$281,898.40) + .02 (\$1,594,096.44)

Total yearly cost - \$186,926.05

Utilities

Electricity - 12 months at \$2,574.59

Total yearly cost - \$ 30,895.08

Selling Expense

Salary - one man per year

Total yearly cost - \$ 9,000.00

x

1151

Management Expense

10,559.00

% of total plant investment

.02 (\$1,594,096.44) -

Total yearly cost -- \$ 31,881.93

*Feb 1966 v*

*Current 1967 5/16/67*

*Acc. wages 2.65*

*3.070*

*Wet. B. 1.361*

*.396*

*Soc. Sec. 6363*

*10420*

*3.0473*

*3.5080*

*3.0473*

*3.5080*

*1517.100000*



9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL

2. Cost Summary

a. Basic 1966 Cost Summary

	<u>With Barker &amp; Chipper</u>	<u>W/Out Barker &amp; Chipper</u>
	<u>Total Costs</u>	<u>Total Costs</u>
Log Pond	\$ 65,959.15	\$ 65,959.15
Sawmill	201,955.93	201,955.93
Green Chain	46,523.34	46,523.34
Planing Mill & Planer Chain	116,332.94	116,332.94
Yarding and Loading	126,862.04	126,862.04
Chipping System	14,898.17	-
Barker System	27,777.02	-
Dry Kilns	26,695.24	29,695.24
Boiler Room	11,799.97	11,799.97
General Expenses	5,833.25	5,833.25
Utilities	35,101.44	30,895.08
General Overhead	198,519.02	186,926.05
Selling Expense	9,000.00	9,000.00
Management Expense	<u>37,074.66</u>	<u>31,881.93</u>
Total Yearly Cost	\$927,332.17	\$863,664.92

9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL

b. Current 1973 Cost Adjustments

(1) Wage Rates and Manpower Costs

(a) Basic Wage Rate. Western Wood Products Association "Employment Summary" for Coast Mills was used to update wage rates.

(b) Workmen's Benefits.

12 months Ending:

	<u>August 1972</u>	<u>October 1973</u>
Health & Welfare	\$0.274	\$0.376
Paid vacations	0.240	0.262
Paid holidays	0.130	0.143
Pensions	<u>0.140</u>	<u>0.248</u>
	\$0.784	\$1.029
Social Security	\$0.216	\$0.288

(c) Wage Adjustment Factors

12 months Ending:

	<u>August 1972</u>	<u>October 1973</u>
Pond to Car Av.		
Base	\$4.056	\$4.433
Workmen's bene- fits	0.784	1.029
Social Security	<u>0.216</u>	<u>0.288</u>
Total	\$5.056/hr.	\$5.750/hr.

Base Wage Rate Index

$$\frac{\$4.433/\text{hr (WWPA 12 mos. ending Oct. 1973)}}{\$4.056/\text{hr (WWPA 12 mos. ending Aug. 1972)}} = 1.093$$

Adjusted Wage Rate Index

$$\frac{\$5.750/\text{hr (WWPA 12 mos. ending Oct. 1973)}}{\$5.056/\text{hr (WWPA 12 mos. ending Aug. 1972)}} = 1.137$$



9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL

(2) Plant and Equipment Costs

(a) Machinery and Equipment. Indices obtained from Bureau of Labor Statistics, Report on Wholesale Prices and Price Indexes.

	Index <u>June 1972</u>	Index <u>Dec. 1973</u>	Index <u>Factor</u>
General Purposes	122.7	130.7	1.065
Electrical	110.6	114.0	1.031
Miscellaneous	120.7	126.3	1.046

Average -  $3.142/3 = 1.047$

(b) Buildings. Index obtained from Boeckh Trends.

(Sched. 18)	Index <u>1972</u>	Index <u>Nov. 1973</u>	Index <u>Factor</u>
Buildings	486.9	543.7	1.117

(3) Current 1973 Weighted Indices

(a) W. Oregon Sawmill Less Sawing Cost - with Debarker & Chipper - w/o dry kiln costs.

Bldg.	$61.1\% \times 21.5\% = 13.1\%$	$\times 1.117 = .146$
Land & Equip.	$61.1\% \times 78.5\% = 48.0\%$	$\times 1.047 = .503$
Labor	$38.9\% \times 100.0\% = 38.9\%$	$\times 1.137 = .442$
	<u>100.0%</u>	<u>1.091</u>

(b) Dry Kiln Cost

Bldg.	$59.5\% \times 21.5\% = 12.8\%$	$\times 1.117 = .143$
Land & Equip.	$59.5\% \times 78.5\% = 46.7\%$	$\times 1.047 = .489$
Labor	$40.5\% \times 100.0\% = 40.5\%$	$\times 1.137 = .460$
	<u>100.0%</u>	<u>1.092</u>

(c) W. Oregon Sawmill Cost Less Sawing Cost w/o Debarker and Chipper Costs and w/o dry kiln costs

Bldg.	$59.7\% \times 12.8\% = 7.6\%$	$\times 1.117 = .143$
Land & Equip.	$59.7\% \times 78.5\% = 46.9\%$	$\times 1.047 = .491$
Labor	$40.3\% \times 100.0\% = 40.3\%$	$\times 1.137 = .458$
	<u>100.0%</u>	<u>1.092</u>

9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL

(d) Western Oregon Sawing Cost

Bldg.	42.3% x 21.5% = 09.1% x 1.117 =	.102
Land & Equip.	42.3% x 78.5% = 33.2% x 1.047 =	.348
Labor	57.7% x 100.0 = <u>57.7%</u> x 1.137 =	<u>.656</u>
	100.0%	1.106%

(4) Updating Costs

(a) Western Oregon Sawmill Less Sawing Cost - with Debarker  
& Chipper (without dry kiln costs)

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index
Buildings	13.1%	X	1.117	=	.146
Land & Equip.	48.0%	X	1.047	=	.503
Wages	38.9%	X	1.137	=	<u>.442</u>

Schedule 18  
Cost

100.0% Weighted Index = 1.091 X \$ 931,668.94  
Schedule 19 Cost = \$ 1,016,450.81  
\$1,016,450.81 = \$36.30/M  
28,000,000 bd ft. log scale

(b) Dry Kiln Cost

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index
Buildings	12.8%	X	1.117	=	.143
Land & Equip.	46.7%	X	1.047	=	.489
Wages	40.5%	X	1.137	=	<u>.460</u>

Schedule 18  
Cost

100.0% Weighted Index = 1.092 X \$ 39,672.66  
Schedule 19 Cost = \$ 43,322.54  
Dry kiln operation cost x .26% \$ 11,263.86

\$11,263.86  
19,600,000 (70% of volume - Douglas fir) = \$0.57/MBF  
log scale



9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL

(c) Western Oregon Sawmill Cost Less Sawing Cost w/o Debarker  
& Chipper Costs & w/o Dry K. Costs

	Schedule 18 Operating Cost in %		Increase Factor		Current Index
Buildings	12.8%	X	1.117	=	.143
Land & Equip.	46.9%	X	1.047	=	.491
Wages	40.3%	X	1.137	=	.458

	Schedule 18 Cost
100.0% Weighted Index = 1.092 X	\$ 847,988.03
Schedule 19 Cost =	\$ 926,002.93
<u>\$926,002.93</u>	=
28,000,000 bd. ft. log scale (dry kiln cost)	= + \$0.57
	33.67/MBF log scale

(d) Western Oregon Sawing Cost

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index
Buildings	09.1%	X	1.117	=	.102
Land & Equip.	33.2%	X	1.047	=	.348
Wages	57.7%	X	1.137	=	.656

	Schedule 18 Cost
100.0% Weighted Index = 1.106 X	\$ 274,905.90
Schedule 19 Cost =	\$ 304,045.92
<u>\$304,045.92</u>	=
134,400 minutes.	= \$2.27 x 1.10 (10% delay factor) = \$ 2.50/minute

9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL

c. Plant Facilities.

Average Cost Adjustment Factor - 1966 to 1972 (Schedule 18)

Building and Wiring

Sawmill building	\$ 67,200.00
Sawmill wiring	17,542.00
Green chain building	10,800.00
Planing Mill building	39,825.00
Planing Mill wiring	6,094.00
Yarding and Loading	
Packaging and dry storage building	64,000.00
Dry storage and box car shed portion of combination building	55,575.00
Dry kilns building	33,210.00
General expense building	16,000.00
General expense wiring	24,000.00
	<u>\$334,246.00</u>

Land and Equipment

Total Plant Cost	\$1853,732.00
Less building and wiring cost	334,246.00
	<u>\$1,519,486.00</u>

Building and Wiring	\$ 334,246.00	x	1.523 <sup>1/</sup>	=	\$ 509,057.00	(Schedule 19)
Land and Equipment	<u>1,519,486.00</u>	x	1.226 <sup>2/</sup>	=	<u>1,862,890.00</u>	21.5%
	\$1,853,732.00		1.280		\$2,371,947.00	78.5%

1/ "Boeckh Trends" 1966 and 1972

2/ BLS - June 1972.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

(Schedule 18) d. Wages and Wage Costs.

<u>Operation</u>	<u>Wages and attendant costs effective June 1, 1965</u>	
Debarking System	\$ 6,126.40	
Chipping System	5,510.40	
Log Pond	25,810.40	
Green Chain	33,510.40	
Planing Mill	62,932.80	
Yarding and Loading	60,480.00	
Boiler Room	<u>3,035.20</u>	
	\$197,405.60	(with debarker and chipper)
	\$185,768.80	(without debarker and chipper)
	<u>With Debarker and Chipper</u>	<u>Without Debarker and Chipper</u>
Basic wage, June 1, 1965	\$197,405.60	\$185,768.80
Wage adjustment factor - (June 1, 1966 thru June 1, 1971) Pg. 3 this supplement	<u>x 1.426</u>	<u>x 1.426</u>
Current BLM Adjusted Wage	\$281,500.38	\$264,906.31
Direct Supervision (10%) Page 84	<u>x 1.100</u>	<u>x 1.100</u>
	\$309,650.42	\$291,396.94
Payroll Overhead (see page 1 of this supplement) (17.4% of basic wage)	+ \$ 48,981.06	+ \$ 46,093.70
Current wages and attendant costs	\$358,631.48	\$337,490.64

9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL

a. Current Plant Operation Costs.

Plant - with Debarker and Chipper  
(without Dry Kiln Costs)

(Schedule 18)

Plant cost and wages - Effective June 1, 1965	\$695,681.00
Deduction of wages and attendant costs - June 1, 1965	- <u>251,198.61</u>
	\$444,482.39
Equipment adjustment factor - updating equipment costs as of June 1972	<u>x 1.280</u>
Current Plant Cost	\$568,937.46
Adjusted BLM wage and attendant costs	+ <u>358,631.48</u>
	\$927,568.94
Deduction of salary of 1 man in sales department - (wages effective June 1, 1965) -	- <u>9,000.00</u>
	\$918,568.94
Adjusted BLM wage for 1 man in sales department - (adjusted from June 1, 1965 to include increases thru June 1, 1972)	+ <u>13,100.00</u>
	\$931,668.94

	\$568,937.46	61.1%
Schedule 19	<u>362,731.48</u>	<u>38.9%</u>
	\$931,668.94	100.0%



9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL

Plant - without Debarker and Chipper  
(without Dry Kiln Costs)

(Schedule 18)

Plant cost and wages - Effective June 1, 1965		\$632,013.75
Deduction of wages and attendant costs - June 1, 1965		<u>- 236,390.79</u>
		\$395,622.96
Equipment adjustment factor - updating equipment costs as of August 1970	x	<u>1.280</u>
Current Equipment Cost		\$506,397.39
Adjusted BLM wage and attendant cost		
	<u>1/</u>	<u>+ 337,490.64</u>
		\$843,888.03
Deduction of salary of 1 man in sales department - (wages effective June 1, 1965) -	<u>1/</u>	<u>- 9,000.00</u>
		\$834,888.03
Adjusted BLM wage for 1 man in sales department - (adjusted from June 1, 1965 to include increases thru June 1, 1972)	<u>1/</u>	<u>+ 13,100.00</u>
		\$847,988.03

Schedule 19	\$506,397.39	59.7%
	<u>341,590.64</u>	<u>40.3%</u>
	\$847,988.03	100.0%

9333.3 - PRODUCTION COSTS  
(Schedule 19)

Dry Kiln Costs

(Schedule 18)

Wages and wage attendant costs

Wages and attendant costs (Effective June 1, 1965)	\$ 8,848.00
Wage adjustment factor (June 1, 1966 thru June 1, 1971 wage increases)	x <u>1.426</u>
Adjusted BLM Wage and attendant costs	\$12,617.25
Supervision (10%)	+ <u>1,261.73</u>
	\$13,878.98
Payroll overhead (17.4%)	<u>2,195.40</u>
	\$16,074.38

Kiln Operation

Plant and Wages - June 1, 1965	\$29,695.24
Less wages and attendant costs (June 1 1965)	- <u>11,259.08</u>
	\$18,436.16
Equipment cost adjustment factor - up- dating costs as of June 1972)	x <u>1.280</u> (Schedule 19)
	\$23,598.28      59.5%
Adjusted BLM wage and attendant costs (see above)	+ <u>16,074.38</u> <u>40.5%</u>
	\$39,672.66      100.0%



9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL

Sawmill Only

Wage and wage attendant costs (Schedule 18)

Wages and attendant costs (Effective June 1, 1965)	\$ 87,281.60
Wage adjustment factor (June 1, 1966 thru June 1, 1971 wage increases)	x 1.426
Adjusted BLM wage and attendant costs	\$124,463.56
Supervision (10%)	+ 12,446.36
	\$136,909.92
Payroll overhead (17.4%)	21,656.66
	\$158,566.58

Plant Operation

Plant and Wages - June 1, 1965	\$201,955.93
Less wages and attendant costs (June 1, 1965)	- 111,065.84
	\$ 90,890.09
Equipment cost adjustment factor - up- dating costs as of June 1972	x 1.280
	\$116,339.32
Adjusted BLM wage and attendant costs (see above)	+ 158,566.58
	\$274,905.90

Schedule 19	\$116,339.32	42.3%
	158,566.58	57.7%
	\$274,905.90	100.0%

9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL

3. Application of Costs

a. General

Introduction

The 1964-65 equipment and manpower cost information is indexed to the current 1973 year. These current costs are applied to a series of eight time studies, involving the head rig time for nearly 4,500 logs.

Data Collection

Data were collected from eight sawmills in western Oregon: two mills in each Roseburg, Medford and Salem districts; and one mill in each Eugene and Coos Bay districts. All mills had equipment configurations similar to the model BLM mill. Head rig time, functional delay time, grade, species, length, diameter and gross and net volume were recorded for each log. Other mill delay times such as equipment breakdown, saw changes and smoke breaks were also recorded. The data for each log were put on a punch card for the analysis phase.

Analysing the Data

Each study was analysed separately using the regression analysis technique to determine the importance of grade, species, length, diameter and percent recovery  $1/$  in predicting head rig time. In all studies, diameter was a highly significant variable, and length was highly significant in all but two studies. The insignificance of length in the two studies may be attributed to the fact that it did not vary greatly. Percent recovery and grade were only significant in one study each, so they were eliminated from further analysis.

It was decided to run an analysis (covariance analysis) to see if the studies could be combined. The results proved negative, so a common weighted equation was computed from an equation from each study. The equations were of the following form:

$$\text{Time per log} = a + b_1 (\text{length}) + b_2 (\text{diameter}) + b_3 (\text{diameter squared})$$

Where:  $a$  = constant

$b_1, b_2, b_3$  = coefficients for the variables



9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL

Six mills sawed mixed species while one mill sawed only white fir and one mill sawed only pine. One mixed specie had a preponderance of hemlock and the others mostly Douglas-fir. Analysis showed there is no apparent difference between species' sawing times. Mixed species mills do not have logically different trends or levels from those of the pure species mills. Times as shown in the following table reflect a mixed species condition.

Application of Time Study Curve to Cost Data

The BLM model mill is equipped to cut approximately 100 MBF per eight hour shift. It was estimated that the mill would run 280 shifts per year. Only 1/3 of the costs of drying were attributed to Douglas-fir since only the upper grades of this species are dried.

9333.3 - PRODUCTION COSTS  
(Schedule 19)

Material on this page has been incorporated elsewhere.



9333.3 - PRODUCTION COSTS

(Schedule 19)

WESTERN OREGON SAWMILL

b. Computation of Costs Per M

The BLM average mill is equipped to cut approximately 100 MBF per eight hour shift, and it was estimated that the mill would run 280 shifts per year. Total production per year 28,000,000 board feet log scale (35,000,000 bd. ft. lumber tally). In the pond, green chain, etc., costs remain relatively uniform per MBF for a mill of this size.

(1) Total adjusted operation costs with debarker and chipper

$$\frac{1,016,450.81}{28,000,000 \text{ (BF log scale)}} = \$36.30$$

Dry Kiln Costs

\*15% (uppers) - Douglas-fir dried  
100% - Minor species dried

\*70% of milling costs attributed to Douglas-fir; 30% to minor species

15% of 70% = 10.5% Douglas-fir  
30.0% Minor species  
40.5%

10.5% ÷ 40.5% = 26% (Douglas-fir)  
74% (Minor species)

Douglas-fir

26% of \$43,322.54 (dry kiln operation costs) = \$11,263.86

11,263.86  
19,600,000 (70% of volume - Douglas-fir = \$0.57/MBF log scale  
\$36.30  
+ .57  
\$36.87/MBF log scale

\*Checked these figures with the 1968 and 1969 WWP Monthly West Coast Mill year end reports. Using Clears Dry against total Douglas-fir, percent is 11.6%.

Decided to continue using the 15%.

For volume for this same period of time, 67% of volume was Douglas-fir; 33% was other species - decided to continue using 70% for Douglas-fir and 30% for minor species.

9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL

(2) Total adjusted operation costs without debarker and chipper

\$926,002.93  
28,000,000 (BF log scale) = \$33.07

\$33.07/M log scale  
.57 (dry kiln cost) see above  
\$33.64 log scale MILLING COST

Minor Species

74% of \$43,322.54 (dry kiln operation costs) - \$32,058.68

\$32,058.68  
8,400,000 bd. ft. (30% of volume - minor species = \$3.82

\$36.30  
+ 3.82  
\$40.12/MBF log scale milling cost with barker & chipper

\$33.07  
+ 3.82  
\$36.89/MBF log scale milling cost without barker & chipper

Sawmill Operation Cost Excluding delay time factor

\$304,045.92 = \$2.27  
134,400 minutes

\$2.27 x 1.10 (delay factor) = \$2.50/minute



9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL

c. Sawing Time

Douglas-fir and Western Hemlock Sawmill Times (Page 1) (1)

Diam.	1/ Volume Based on the Formula $V = (.79D^2 - 2D - 4)$ (x 1.25)	2/ Time Log Minutes	3/ Time per MBF Gross Log	4/ Delay Adjustment (10%)	5/ Recovery Percent	6/ Time per MBF Net Scale	7/ Sawing Cost/M	8/ Total Milling Cost/M
8	38	.64	16.84	18.52	.96	19.29		
9	52	.65	12.50	13.75	.96	14.32		
10	69	.68	9.85	10.83	.95	11.40		
11	87	.71	8.16	8.98	.94	9.55		
12	107	.75	7.01	7.71	.94	8.20		
13	129	.80	6.20	6.82	.93	7.33		
14	154	.85	5.52	6.07	.93	6.53		
15	180	.92	5.11	5.62	.92	6.11		
16	208	.99	4.76	5.24	.92	5.70		
17	238	1.08	4.54	4.99	.91	5.48		
18	270	1.17	4.33	4.76	.91	5.23		
19	304	1.27	4.18	4.60	.90	5.11		
20	340	1.38	4.07	4.48	.90	4.98		
21	378	1.49	3.94	4.33	.89	4.87		
22	418	1.62	3.88	4.27	.89	4.80		
23	460	1.75	3.80	4.18	.89	4.70		
24	504	1.89	3.75	4.12	.88	4.68		
25	550	2.04	3.71	4.08	.87	4.68		
26	597	2.20	3.68	4.05	.87	4.68		
27	647	2.36	3.65	4.02	.86	4.67		
28	699	2.54	3.63	3.99	.86	4.64		
29	752	2.72	3.62	3.98	.86	4.63		
30	809	2.92	3.61	3.97	.85	4.67		
31	866	3.12	3.60	3.96	.84	4.71		
32	926	3.32	3.59	3.95	.84	4.72		
33	987	3.54	3.59	3.95	.84	4.72		
34	1051	3.77	3.59	3.95	.83	4.75		
35	1117	4.00	3.58	3.94	.83	4.75		
36	1185	4.24	3.58	3.94	.82	4.80		
37	1254	4.49	3.58	3.94	.82	4.80		
38	1326	4.75	3.58	3.94	.81	4.86		
39	1400	5.02	3.59	3.95	.80	4.94		
40	1475	5.30	3.59	3.95	.80	4.94		

9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL

Douglas-fir and Western Hemlock Sawmill Times (Page 2)

Diam.	<u>1/</u> Volume Based on the Formula $V = (.79D^2 - 2D - 4)$ (x 1.25)	<u>2/</u> Time Log Minutes	<u>3/</u> Time per MBF Gross Log	<u>4/</u> Delay Adjustment (10%)	<u>5/</u> Recovery Percent	<u>6/</u> Time per MBF Net Scale	<u>7/</u> Sawing Cost/M	<u>8/</u> Total Milling Cost/M
L1	1552	5.58	3.60	3.96	.80	4.95		
L2	1632	5.87	3.60	3.96	.79	5.01		
L3	1714	6.17	3.60	3.96	.79	5.01		
L4	1796	6.48	3.61	3.97	.79	5.03		
L5	1882	6.80	3.61	3.97	.79	5.03		

- 1/ Volume based on the Scribner approximation formula for a 20 foot log. Twenty feet was the average length of logs from the studies and it was used to compute Douglas-fir costs. Other lengths may be used for minor species.
- 2/ Time per log as computed from the "common" equation using 20 feet as a constant length.
- 4/ A delay adjustment of 10% was made in time per Mbf. This percentage was computed as a weighted average from the studies.
- 5/ Percent recovery is the adjustment used to change time per Mbf from gross to a net log scale basis. These percents were computed by running a regression on the study data using diameter to predict percent recovery.
- 7/ Sawmill cost per minute multiplied by the time per Mbf. It was decided that only the costs in the sawmill itself were directly dependent upon the individual log size. In the pond, green chain, etc., costs remain relatively uniform per Mbf for a mill of this size.
- 8/ Addition of fixed cost per Mbf to sawmill cost.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL

True Firs - Incense Cedar and Western Red Cedar Sawmill Times (Page 1) (2)

Diam.	1/ Volume Based on the Formula $V = (.79D^2 - 2D - 4)$ (16' logs)	2/ Time/Log Minutes	3/ Time per MBF Gross Log	4/ Delay Adjustment (10%)	5/ Recovery Percent	6/ Time per MBF Net Scale	7/ Sawing Cost/M	8/ Total Milling Cost/M
8	31	.41	13.23	14.55	.96	15.16		
9	42	.42	10.00	11.00	.96	11.46		
10	55	.45	8.18	9.00	.95	9.47		
11	70	.48	6.86	7.55	.94	8.03		
12	86	.52	6.05	6.66	.94	7.09		
13	104	.57	5.48	6.03	.93	6.48		
14	123	.63	5.12	5.63	.93	6.05		
15	144	.69	4.79	5.27	.92	5.73		
16	166	.77	4.64	5.10	.92	5.54		
17	190	.85	4.47	4.92	.91	5.41		
18	216	.94	4.35	4.78	.91	5.25		
19	243	1.04	4.28	4.71	.90	5.23		
20	272	1.15	4.23	4.65	.90	5.17		
21	302	1.26	4.17	4.59	.89	5.16		
22	334	1.39	4.16	4.58	.89	5.15		
23	368	1.52	4.13	4.54	.89	5.10		
24	403	1.66	4.12	4.53	.88	5.15		
25	440	1.81	4.11	4.52	.87	5.19		
26	478	1.97	4.12	4.53	.87	5.21		
27	518	2.14	4.13	4.54	.86	5.28		
28	559	2.31	4.13	4.54	.86	5.28		
29	602	2.50	4.15	4.56	.86	5.30		
30	647	2.69	4.16	4.58	.85	5.39		
31	693	2.89	4.17	4.59	.84	5.46		
32	741	3.10	4.18	4.60	.84	5.48		
33	790	3.31	4.19	4.61	.84	5.49		
34	841	3.54	4.21	4.63	.83	5.58		
35	894	3.77	4.22	4.64	.83	5.59		
36	948	4.01	4.23	4.65	.82	5.67		
37	1004	4.26	4.24	4.66	.82	5.68		
38	1061	4.52	4.26	4.69	.81	5.79		
39	1120	4.79	4.28	4.71	.80	5.89		
40	1180	5.07	4.30	4.73	.80	5.91		

9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL

True Firs - Incense Cedar and Western Red Cedar Sawmill Times (Page 2)

Diam.	1/ Volume Based on the Formula $V = (.79D^2 - 2D - 4)$ (16' logs)	2/ Time Log Minutes	3/ Time per MBF Gross Log	4/ Delay Adjustment (10%)	5/ Recovery Percent	6/ Time per MBF Net Scale	7/ Sawing Cost/M	8/ Total Milling Cost/M
41	1242	5.35	4.31	4.74	.80	5.93		
42	1306	5.64	4.32	4.75	.79	6.01		
43	1371	5.94	4.33	4.76	.79	6.03		
44	1437	6.25	4.35	4.78	.79	6.05		
45	1506	6.57	4.36	4.80	.79	6.08		

1/ Volume based on the Scribner approximation formula for a 16 foot log.

2/ Time per log as computed from the "common" equation using 16 feet as a constant length.

4/ A delay adjustment of 10% was made in time per MBF. This percentage was computed as a weighted average from the studies.

5/ Percent recovery is the adjustment used to change time per MBF from gross to a net log scale basis. These percents were computed by running a regression on the study data using diameter to predict percent recovery.

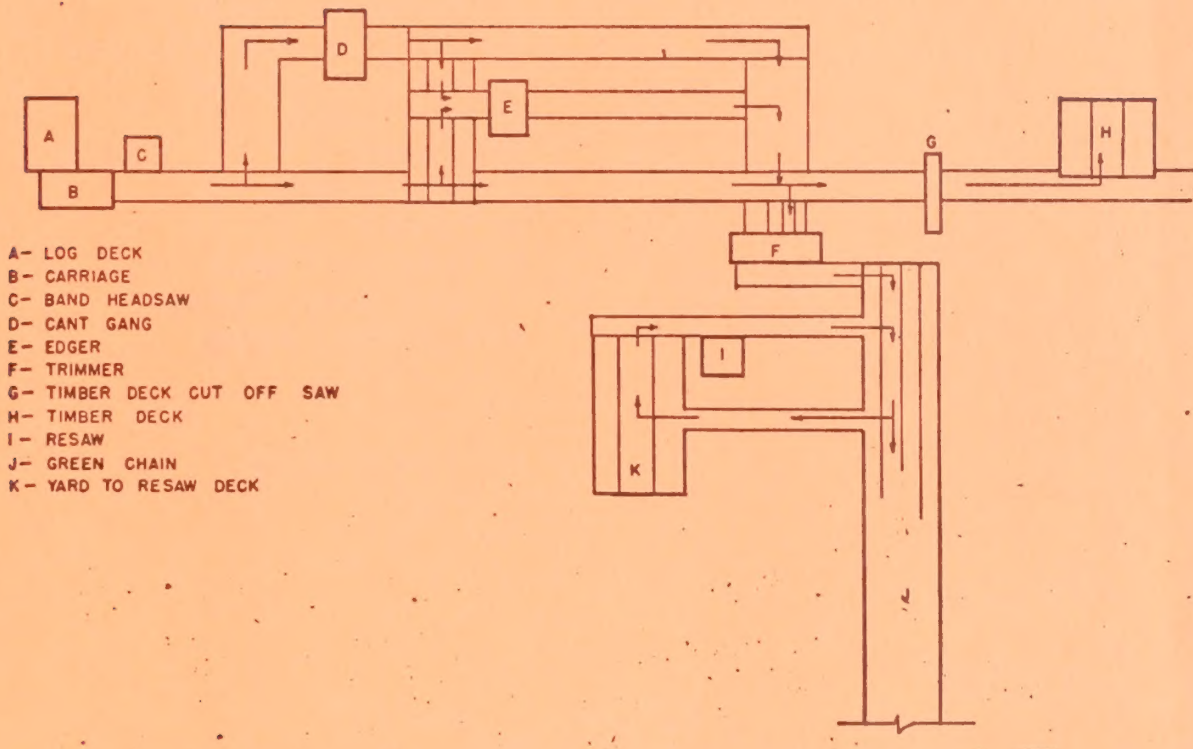
7/ Sawmill cost per minute multiplied by the time per MBF. It was decided that only the costs in the sawmill itself were directly dependent upon the individual log size. In the pond, green chain, etc., costs remain relatively uniform per MBF for a mill of this size.

8/ Addition of fixed cost per MBF to sawmill cost.



9333.3 - PRODUCTION COSTS  
(Schedule 19)  
WESTERN OREGON SAWMILL

SAWMILL LAYOUT



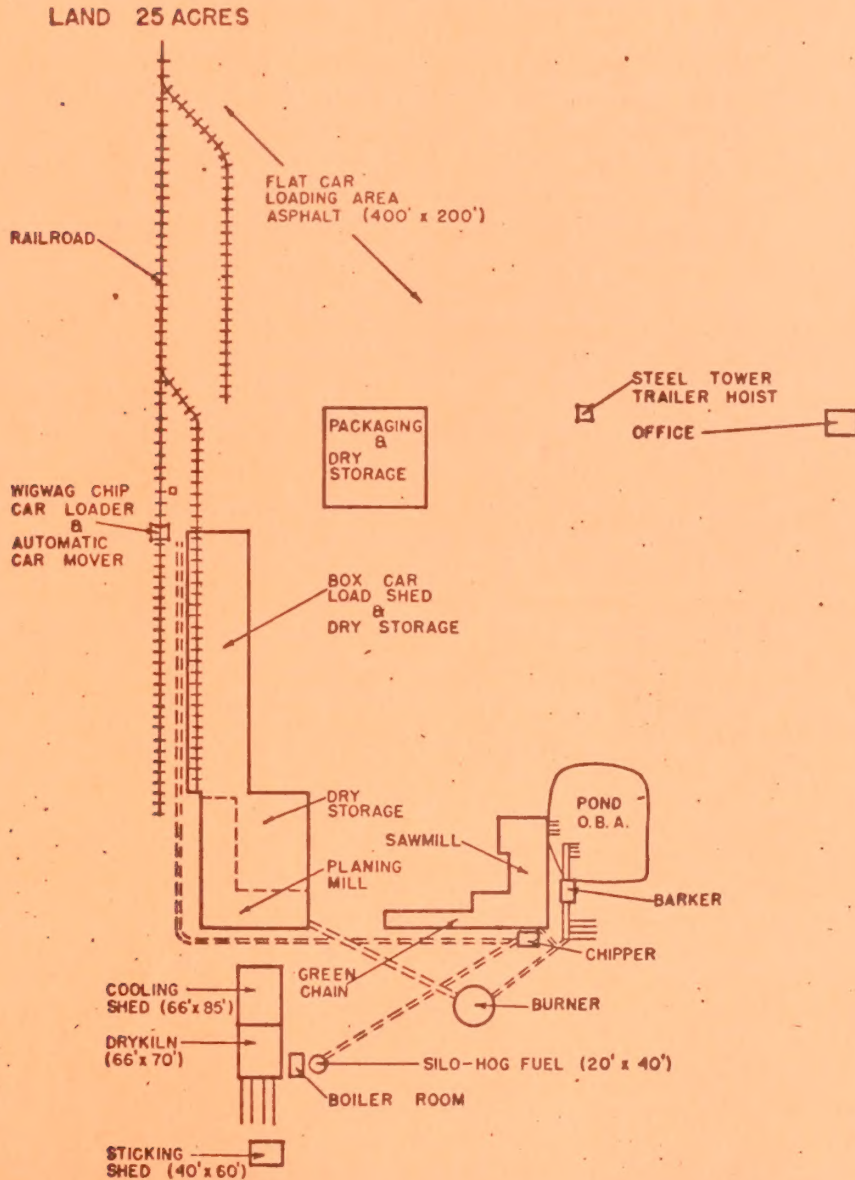




9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL

DOUGLAS FIR SAWMILL LAYOUT



9333.3 - PRODUCTION COSTS  
(Schedule 19)

C. EASTERN OREGON SAWMILL

The initial step in a lumber milling cost determination is to define the manufacturing unit which is to process the timber. The capacity of an "average" or "representative" mill was set out and the type of equipment determined.

The 1957 Western Pine Association Directory of Membership was consulted for information on the 8-hour capacity for each plant in Oregon which cut more than occasional amounts of pine and an average capacity was determined for these mills - 90 MBF per 8 hours. Production statistics for non-member mills in Oregon were obtained from the 1957 "Lumberman Handbook and Directory of Western Forest Industries" (the Cascade range set the western boundary with the line running west in southern Oregon to include the Ashland and Medford areas). Non-member mills averaged approximately 41 MBF per shift. The two groups were consolidated and an average capacity figured to be approximately 71 MBF per 8 hours. The median and the mode of the total group both indicated a mill capacity of 60 MBF.

Information from the two directories previously mentioned indicated that 53% of the mills by number, possessing 73% of the total 8-hour capacity, were equipped with dry kilns.

Headsaw data was available on 79% of the mills under consideration, 81% by total 8-hour capacity. Of these mills, 67% of them are using band saws and own 86% of the total 8-hour capacity.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

EASTERN OREGON SAWMILL

1. Cost Development

a. Bases for Cost Allocations.

Milling costs are broken into the following: Depreciation, Labor, Direct Supervision, Payroll Overhead, Maintenance, Operating Supplies, Operating Expenses (saw, knives, gas, etc.), Taxes, Insurance, General Overhead, Utilities, Selling Expense and Management Costs. The sections from Depreciation through Insurance will be set out in each applicable division of production including pond, sawmill, green chain, dry kilns, dry sorter, planing mill, yarding and loading, boiler room and general expenses. The other sections, i.e., overhead, utilities, etc., will include those costs for the entire operation.

The base working period for a year is 240 days of 8 hours each. This is based on a 365 day year, working 5 days per week with a two-week shutdown each year, 8 holidays (includes two days at Christmas and New Years) and an allowance of 3 days total for breakdowns or other shutdowns.

(1) Depreciation, as considered herein, is the loss of value of the physical property in the mill during the useful life of such property. This loss is replaced from gross revenues before net income is considered available.

The straight line method is used. It provides equal annual allowances, is easy to use and it is probably the most widely used in industry. This involves the setting aside or accounting for each year during the life of the property, equal values, the sum of which equals the value new less the salvage value.

The life for various pieces of equipment seems to be an elusive bit of information to secure, even from manufacturers and dealers, so in most cases we will of necessity use suggested allowances from Internal Revenue Service schedules.

9333.3 - PRODUCTION COSTS  
(Schedule 19)

EASTERN OREGON SAWMILL

(2) Labor and Manpower.

(a) Basic Rates. The wage rates for the positions as determined from the mill visits, were obtained from the Western Council A.F.L. and applied in the individual sections. Chart 1 contains basic wage rates effective February, 1960.

(b) Adjustment Factors. Includes social security payments, unemployment compensation, vacation pay, health and welfare benefits, holidays, etc.

The vacation pay was estimated as a percentage of the total days worked (2 weeks per year would, of course, be 10 working days or 4.17% of the total 240 worked). The percentages, social security 2.0%, holidays 2.50%, health and welfare 3.49%, plus 4.17% vacation pay, total 12.16%. To include the additional payroll overhead outlays (pensions, disability wages and discontinuance wages) by the employer, we have used the 16% suggested in the previously mentioned Oregon Forest Products Laboratory Information Circular 9. The 16% is multiplied by the total direct labor in each department to derive the cost of payroll overhead for that department as of February, 1960.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

EASTERN OREGON SAWMILL  
(Cost Development)

Chart 1  
Page 1

BASIC WAGE RATES  
Effective February 1, 1960

<u>Position</u>	<u>Rate \$/hr.</u>
Deck Man	2.185
Scalers	2.095
Sawyer	2.945
Tail Sawyer	2.145
Edger Man	2.455
Edging Picker	2.105
Trimmer Men	2.235
Resawyer	2.355
Resaw Helper	2.125
Filer	3.125
Marker	2.235
Green Chain Pullers	2.215
Dry Kiln Operator	2.255
Kiln Loaders	2.115
Hoist Operator and Sticker Man	2.155
Graders	2.405
Planer Setup	2.365
Planer Feeder	2.215
Planer Chain Puller	2.295
Tally Man	2.165
Car Loaders	2.215
Carrier Drivers	2.275
Fork Lift Drivers	2.275
Boilermen	3.125
Common Laborer	2.055

9333.3 - PRODUCTION COSTS  
(Schedule 19)

EASTERN OREGON SAWMILL  
(Cost Development)

Chart 1 (Continued)  
Page 2

<u>Number</u> <u>Employees</u>	<u>Mill</u> <u>Operation</u>	<u>1960 Mill</u> <u>Study Wages</u>
3	Log Pond	\$ 12,921.60
10	Sawmill	45,580.80
4	Green Chain	17,049.60
4	Dry Kilns	16,512.00
5	Dry Sorter	21,974.40
7	Planing Mill	31,152.00
9	Yarding & Loading	38,640.00
<u>3</u>	<u>Boiler Men</u>	<u>12,240.00</u>
45		\$196,070.40

Average wage 1960

$\$196,070.40 \div 1920 \text{ hrs.} = \$102.12 \div 45 \text{ employees} = \$2.26/\text{hr. avg. wg.}$



9333.3 - PRODUCTION COSTS  
(Schedule 19)

EASTERN OREGON SAWMILL  
(Cost Development)

(3) Additional Cost Allocations. Except for carrier and lift truck expenses and decking shovel expenses, the methods for determining the following items were taken from the Oregon Forest Products Laboratory Information Circular 9, "Cost Estimating For Wood Industries" by L. D. Coolidge and J. R. Pfeiffer - direct supervision, 10% of direct labor; maintenance, 4% of physical plant costs; operating supplies, 5% of physical plant cost; general overhead, 55% of direct labor cost plus 2% of the investment in the physical plant cost; and management expenses, 1-3 (we will use 2) % of the total plant investment. One of the authors, Mr. P. R. Pfeiffer, was consulted regarding the reliability of these estimates. He reports that this information came from many sources - mills, insurance companies, equipment manufacturers, State Corporation Commission, and engineers; and is as reliable as they could possibly obtain. The estimates within one department, such as the dry sorter, may vary slightly from actual experience, but the estimates for the total operation when summed are reliable.

(4) Selling Expense. The commissions given to wholesalers or others and the discounts allowed for prompt payment are considered in the selling value of the lumber. Since a mill of this size would ship two cars of lumber every day and a third car every two or three days, one man at a salary of about \$6,000 would be able to handle the sales department work.

9333.3 - PRODUCTION COSTS  
(Schedule 19)

EASTERN OREGON SAWMILL  
(Cost Development)

.b Direct Labor and Investment Costs.

COST DEVELOPMENT BY DIVISIONS OF MFG.

(1) LOG POND

Depreciation

	Value	Residual	Life	Yearly Depreciation Allowance	
Excavation	260	0	20	\$ 13.00	
Unloading Hoist-Bldg.					
Bldg. and Drum	700	0	20	35.00	
Reducer, Motor, A-Frame	1,307	0	17	77.00	
Decking Shovel	<u>12,000</u>	0	10	<u>1,200.00</u>	\$ 1,325.00
	14,267				

Labor

Unloader and Scaler,	1920 hrs. at \$2.095	\$4,022.40	
Decking Shovel Operator,	" " " \$2.450	4,704.00	
Slip Man,	" " " \$2.185	<u>4,195.20</u>	\$12,921.60
Direct Supervision - 10% Direct Labor Cost			1,292.16
Payroll Overhead - 16% Direct Labor Cost			2,067.46
Maintenance - 4% Physical Plant Cost + 16% Shovel			2,010.68
Operating Supplies - .5% Physical Plant Cost less Shovel			11.34
Taxes - 2% Physical Plant Cost			285.34
Insurance - 1% Physical Plant Cost			142.67
Operating Expenses (Fuel & Oil), 1920 hrs. at \$.930		<u>1,785.60</u>	
TOTAL			\$21,841.85
AVERAGE COST PER MBF			\$1.30



9333.3 - PRODUCTION COSTS

(Schedule 19)

EASTERN OREGON SAWMILL  
(Cost Development - Direct Costs)

Depreciation	(2)	<u>SAWMILL</u>		Yearly Depreciation Allowance
	Value	Residual	Life	
Building				
Structure	\$42,800	0	50	856.00
Wiring	8,000	0	20	400.00
Plumbing	4,200	0	25	168.00
Steam Piping	4,200	0	25	168.00
Air Conduit	130	0	25	5.20
Log Haul - Machine etc.	15,760	0	15	1,050.00
Motor and Starter	1,050	0	17	61.76
Deck Saw	1,820	0	10	182.00
Log Kicker	4,220	0	20	211.00
Log Stop and Loader	4,550	0	20	227.50
Steam Nigger	4,720	0	20	236.00
Carriage and Tracks	24,740	10%	20	1,113.30
Shotgun Feed	8,110	0	20	405.50
Bandmill	21,565	0	25	862.60
Motor and Starter	5,995	0	22	272.50
Resaw	22,340	0	25	893.60
Motor and Starter	4,410	0	22	200.46
Edger	13,280	0	25	531.20
Motor and Starter	2,450	0	22	111.36
Circular Saws (Remov- able Teeth)	1,787	0	10	178.70
Trimmer	13,122	0	25	524.88
Motor and Starter	2,535	0	17	149.12

9333.3 - PRODUCTION COSTS

(Schedule 19)

EASTERN OREGON SAWMILL

(Cost Development - Direct Costs)

SAWMILL(Cont'd)

Depreciation	Value	Residual	Life	Yearly Depreciation Allowance	
Chain System - (Chains, Sprockets)	11,010	0	10	1,101.00	
Motor and Starters	11,180	0	17	657.65	
Tables or decks	2,170	0	50	43.40	
Live Roll System	14,250	0	25	570.00	
Motors and Starters	3,850	0	17	226.47	
Drop Skids and Stops	16,000	0	20	800.00	
Saw Filing Equipment	6,960	0	30	232.00	
Chain Saw Grinder	330	0	30	11.00	
Hog	6,534	0	10	653.40	
Motor & Starter	3,060	0	22	139.09	
Knife Grinder	3,795	0	15	253.00	
Refuse Conveying System					
Chains, sprockets, etc.	24,905	0	10	2,490.50	
Motors & Starters	2,720	0	17	160.00	
Support & Troughs	13,550	0	10	1,355.00	
Sawdust Conveying	10,000	0	12	833.33	
Air Compressor	2,100	0	10	210.00	
Welding Arc	670	0	18	37.22	
Cutting Torch	185	0	10	18.50	
Tools & Equipment	2,900	0	10	290.00	
Refuse Burner	<u>7,520</u>	0	20	<u>376.00</u>	319,266.24
	355,473				



9333.3 - PRODUCTION COSTS  
(Schedule 19)

EASTERN OREGON SAWMILL  
(Cost Development - Direct Costs)

SAWMILL (CONT'D)

Labor

Cut Off Saw & Scaler, 1920 hrs. at \$2.195	\$4,214.40	
Sawyer, " " " 2.945	5,654.40	
Setter, " " " 2.435	4,675.20	
Tail Sawyer, " " " 2.145	4,118.40	
Edgerman, " " " 2.455	4,713.60	
Edging Picker, " " " 2.105	4,041.60	
Trimmerman, " " " 2.235	4,291.20	
Resaw Operator " " " 2.355	4,521.60	
Resaw Helper, " " " 2.125	4,080.00	
Filer, " " " 3.125	6,000.00	
Handyman, " " " 2.055	<u>3,945.60</u>	\$ 50,256.00
Direct Supervision - 10% of Direct Labor		5,025.60
Payroll Overhead - 16% of Direct Labor		8,040.96
Maintenance - 4% Physical Plant Cost		14,218.92
Operating Supplies - .5% Physical Plant Cost		1,777.37
Taxes - 2% Physical Plant Cost		7,109.46
Insurance - 1% Physical Plant Cost		3,554.73
Operating Expenses (Saw & Knife Expense)		<u>5,927.00</u>
TOTAL YEARLY COST		\$115,176.28
AVERAGE COST PER MBF		\$6.86

(C.1.b)

## 9333.3 - PRODUCTION COSTS

(Schedule 19)

EASTERN OREGON SAWMILL

(Cost Development - Direct Costs)

(3) GREEN CHAIN

## Depreciation

	<u>Value</u>	<u>Residual</u>	<u>Life</u>	<u>Depreciation</u>
Building	6,000	-	50	\$ 120.00
Chain - Chains, Bearings, etc.	4,875	-	10	487.50
Motor & Starter	2,100	-	17	123.53
Table	<u>4,800</u>	-	50	<u>96.00</u>
	17,775			\$ 827.03

## Labor

Marker	1920 hrs. at \$2.235	\$ 4,291.20
3 Pullers	" " " \$2.215 ea.	<u>12,758.40</u>
		\$17,049.60
Direct Supervision	- 10% Direct Labor Costs	1,704.96
Payroll Overhead	- 16% " " "	2,727.94
Maintenance	- 4% Physical Plant Cost	711.00
Operating Supplies	- .5% " " "	88.88
Taxes	- 2% " " "	355.50
Insurance	- 1% " " "	<u>177.75</u>
	TOTAL YEARLY COST	\$23,642.66
	AVERAGE COST PER MBF	\$1.41



(C.1.b)

## 9333.3 - PRODUCTION COSTS

(Schedule 19)

EASTERN OREGON SAWMILL  
(Cost Development - Direct Costs)

(4) DRY KILNS

## Depreciation

	<u>Value</u>	<u>Residual</u>	<u>Years</u>	<u>Depreciation</u>	
Buildings	30,000	-	40	\$ 750.00	
Equip. & Installation	49,580	-	20	2,479.00	
Cooling Sheds	6,720	-	50	134.40	
Stickers	<u>2,280</u>	-	5	<u>456.00</u>	\$ 3,819.40
	88,580				

## Labor

3 Stackers, 1920 hrs. at \$2.115 ea.				\$12,182.40	
1 Operator, 1920 hrs. at \$2.255				<u>4,329.60</u>	\$16,512.00
Direct Supervision - 10% Direct Labor Cost					1,651.20
Payroll Overhead - 16% " " "					2,641.92
Maintenance - 4% Physical Plant Cost					3,543.20
Operating Supplies - .5% " " "					442.90
Taxes - 2% " " "					1,771.60
Insurance - 1% " " "					<u>885.80</u>
				TOTAL YEARLY COST	\$31,268.02
				AVERAGE COST PER MBF	\$1.86

9333.3 - PRODUCTION COSTS

(Schedule 19)

EASTERN OREGON SAWMILL  
(Cost Development - Direct Costs)

(5) DRY SORTER

Depreciation

	<u>Value</u>	<u>Residual</u>	<u>Life</u>	<u>Depreciation</u>	
Building	24,000	-	50	\$ 480.00	
Unstacker	5,960	-	20	298.00	
Sticker - Remov. Belt, Bearings, etc.	660	-	20	33.00	
Motor & Starter	718	-	17	42.24	
Frame	200	-	20	10.00	
Chains, sprockets, bearings, etc.	4,830	-	10	483.00	
Motor & Starter	3,925	-	17	230.88	
Table	<u>4,440</u>	-	50	<u>88.80</u>	\$ 1,665.92
	44,733				

Labor

Hoist Operator & Stickerman, 1920 hrs. at \$2.155	\$ 4,137.60	
Grader, " " " \$2.405	4,617.60	
3 Pullers, " " " \$2.295 ea.	<u>13,219.20</u>	\$21,974.40
Direct Supervision - 10% Direct Labor Cost		2,197.44
Payroll Overhead - 16% Direct Labor Cost		3,515.90
Maintenance - 4% Physical Plant Cost		1,789.32
Operating Supplies - .5% " " "		223.67
Taxes - 2% " " "		894.66
Insurance - 1% " " "		<u>447.33</u>
TOTAL YEARLY COST	\$32,708.64	
AVERAGE COST PER MBF	\$1.95	



9333.3 - PRODUCTION COSTS  
(Schedule 19)

EASTERN OREGON SAWMILL  
(Cost Development - Direct Costs)

(6) PLANING MILL

Depreciation

	<u>Value</u>	<u>Residual</u>	<u>Life</u>	<u>Depreciation</u>
Building	36,340	-	50	\$ 726.90
Tilting Unloading Hoist	5,950	-	20	297.50
Floor Storage, Chains, bearings, Sprockets, etc.	2,180	-	10	218.00
Motor & Starter	1,825	-	17	107.35
Planer & Grinding Equipment	65,730	10%	20	2,957.85
Cutterheads	5,640	-	20	282.00
Chain System - Chains, Sprockets, Bearings, etc.	4,060	-	10	406.00
Motors & Starters	3,875	-	17	227.94
Table	1,120	-	50	22.40
Trimmer	11,290	-	25	451.60
Blower System - Blower	8,350	-	15	556.67
Motor & Starter	2,400	-	22	109.09
Pipe & Cyclone Supports	<u>1,650</u>	-	30	<u>55.00</u>
	150,410			\$ 6,418.30

Labor

Planerman, 1920 hrs. at \$2.365	\$ 4,540.80
Feeder, " " " \$2.215	4,252.80
Trimmerman, " " " \$2.235	4,291.20
Grader, " " " \$2.525	4,848.00
3 Pullers, " " " \$2.295 ea.	<u>13,219.20</u>
	\$31,152.00
Direct Supervision - 10% Direct Labor Cost	3,115.20
Payroll Overhead - 16% " " "	4,984.32
Maintenance - 4% Physical Plant Cost	6,016.40
Operating Supplies - .5% " " "	752.05
Taxes - 2% " " "	3,008.20

(C.1.b)

9333.3 - PRODUCTION COSTS

(Schedule 19)

EASTERN OREGON SAWMILL

(Cost Development - Direct Costs)

(Planing Mill Cont'd)

Insurance	- 1% Physical Plant Cost	\$ 1,504.10
Operating Expense (Saw & Knife Expense)		<u>2,023.20</u>
TOTAL YEARLY COST		\$58,973.77
AVERAGE COST PER MBF		\$3.51



9333.3 - PRODUCTION COSTS  
(Schedule 19)

EASTERN OREGON SAWMILL  
(Cost Development - Direct Costs)

(7) YARDING AND LOADING

Depreciation

	<u>Value</u>	<u>Residual</u>	<u>Life</u>	<u>Depreciation</u>
Dry Shed	51,200	-	50	\$ 1,024.00
Carriers	22,240	10%	10,000 hrs.	3,840.00
Lift Truck	22,860	10%	12,000 hrs.	3,291.84
Railroad Siding	13,200	10%	25	475.20
Bunks	1,280	-	2	640.00
Blocks	<u>700</u>	-	4	<u>175.00</u>
	111,480			\$ 9,446.04

Labor

Tallyman	1920 hrs. at \$2.165	\$ 4,156.80	
4 Car Loaders,	" " " \$2.215 ea.	17,011.20	
2 Carrier Drivers,	" " " \$2.275 ea.	8,736.00	
2 Lift Truck Drivers,	" " " \$2.275 ea.	<u>8,736.00</u>	\$38,640.00
Direct Supervision - 10% Direct Labor Cost			3,864.00
Payroll Overhead - 16% " " "			6,182.40
Operating Supplies - .5% Physical Plant Cost less carriers and lift trucks			331.90
Taxes	- 2% Physical Plant Cost	1,327.60	
	- 2% Ave. lift truck & carrier	<u>487.58</u>	\$ 1,815.18
Insurance	- 1% Physical Plant Cost	663.80	
	- 1% Ave. lift truck & carrier	<u>243.79</u>	907.59
Maintenance	- 4% shed, siding blocks and bunks	2,655.20	
Carriers & lift trucks, 1920 hrs. at \$3.82 (see page 59)		<u>7,334.40</u>	9,989.60
Operating Expenses			
Fuel, 7 gal. per hr. at \$0.23 x 1920 hrs.			<u>3,091.20</u>

TOTAL YEARLY COST \$74,267.91

BLM Manual Supplement  
State Office-Oregon

AVERAGE COST PER MBF \$4.42

Release 9-113  
5/1/74

9333.3 - PRODUCTION COSTS  
(Schedule 19)

EASTERN OREGON SAWMILL  
(Cost Development - Direct Costs)

(8) BOILER ROOM

Depreciation

	<u>Value</u>	<u>Residual</u>	<u>Life</u>	<u>Depreciation</u>
Building	7,000	-	50	\$ 140.00
Boilers & all equipment	60,000	-	25	2,400.00
Steam pipe to Mill	2,400	-	25	96.00
Steam pipe to kiln	2,400	-	25	96.00
Fuel Bin	800	-	50	16.00
Fuel Conveyor				
Hog to Bin & Bin to Boiler				
Trough & Support	9,600	-	25	384.00
Chains, sprockets, etc.	17,645	-	10	1,765.00
Motor and Starter	<u>1,990</u>	-	17	<u>117.06</u>
	101,835			\$ 5,014.06

Labor

3 Boilermen, 1920 hrs. at \$2.125	\$12,240.00
Direct Supervision - 10% Direct Labor Cost	1,224.00
Payroll overhead - 16% " " "	1,958.40
Maintenance - 4% Physical Plant Cost	4,073.40
Operating Supplies - .5% " " "	509.18
Taxes - 2% " " "	2,036.70
Insurance - 1% " " "	<u>1,018.35</u>
TOTAL YEARLY COST	\$28,074.09
AVERAGE COST PER MBF	\$1.67



9333.3 - PRODUCTION COSTS  
(Schedule 19)

EASTERN OREGON SAWMILL  
(Cost Development - Direct Costs)

(9) Barker System

<u>A. Depreciation</u>				<u>Yearly Depreciation Allowance</u>
	<u>Value</u>	<u>Residual</u>	<u>Life</u>	
Barker assembly	\$176,947.50	--	16.6 yr	\$10,659.49
Refuse conveyor:				
Motors and starters	1,725.00	--	17 yr	101.47
Supports, chain, trough, etc.	16,635.00	--	10 yr	1,663.50
Log deck cut-off saw	2,370.00	--	15 yr	158.00
	<u>\$197,677.50</u>			\$12,582.46
<u>B. Labor</u>				
	<u>Basic Wage</u>	<u>Hours</u>	<u>Total Wage</u>	
Barker operator	\$2.735	2240	<u>\$6,126.40</u>	6,126.40
<u>C. Direct Supervision</u> - 10% of direct labor costs				612.64
<u>D. Payroll Overhead</u> - 17.25% of direct labor costs				1,056.80
<u>E. Operating Supplies</u> - .5% of physical plant cost				983.39
<u>F. Taxes</u> - 2% of physical plant cost				3,953.55
<u>G. Insurance</u> - 1% of physical plant cost				1,976.78
<u>H. Operating Expenses</u> (replace chain saw chains)				<u>480.00</u>
Total yearly cost =				\$27,777.02

9333.3 - PRODUCTION COSTS  
(Schedule 19)

Chipping System

A. <u>Depreciation</u>	<u>Value</u>	<u>Residual</u>	<u>Life</u>	<u>Yearly Depreciation Allowance</u>	
Entire chipping and car loading system	\$61,959.00	--	14.8 yr	<u>\$ 4,186.42</u>	\$ 4,186.42
B. <u>Labor</u>		<u>Basic Wage</u>	<u>Hours</u>	<u>Total Wage</u>	
Chipper operator		\$2.46	2240	<u>\$ 5,510.40</u>	5,510.40
C. <u>Direct Supervision</u> - 10% of direct labor cost					551.04
D. <u>Payroll Overhead</u> - 17.25% of direct labor cost					950.54
E. <u>Operating Supplies</u> - .5% of physical plant cost					309.80
F. <u>Taxes</u> - 2% of physical plant cost					1,239.18
G. <u>Insurance</u> - 1% of physical plant cost					619.59
H. <u>Operating Expense</u> (knife expense)					<u>1,531.20</u>
Total Yearly cost -					\$14,898.17



9333.3 - PRODUCTION COSTS  
(Schedule 19)

EASTERN OREGON SAWMILL  
(Cost Development - Direct Costs)

(10) GENERAL EXPENSES

Depreciation

	<u>Value</u>	<u>Life</u>	<u>Residual</u>	<u>Depreciation</u>
Warehouse	10,000	50	-	200.00
Office	25,000	50	-	500.00
Toilets (2)	4,200	25	-	168.00
Primary Wiring	1,100	20		55.00
Primary Water Piping	3,500	25	-	140.00
Land (20 Acres \$100/acre)	<u>2,000</u>	-	2,000	<u>-</u> \$1,063.00
	45,800			

Maintenance	-	4%	Physical Plant Cost (Excluding Land)	1,752.00
Operating Supplies	.5%	"	"	229.00
Taxes	2%	"	"	916.00
Insurance	1%	"	"	<u>458.00</u>

TOTAL YEARLY COST \$4,418.00

AVERAGE COST PER MBF \$0.26

9333.3 - PRODUCTION COSTS  
(Schedule 19)

WESTERN OREGON SAWMILL  
(Cost Development - Direct Costs)

c. General Overhead and Management Without Barker or Chipper.

GENERAL OVERHEAD

55% of Direct Labor Costs + 2% of investment in plant.

.55 (\$200,745.60) + .02 (\$930,353)	TOTAL YEARLY COST	\$129,017.14
	AVERAGE COST PER MBF	\$7.68

UTILITIES

1,463,316 cu. ft. water per year at \$90.16/cu. ft.	\$ 1,319.33	
Electricity - 12 months at \$1,753.12/month	<u>\$21,037.44</u>	
	TOTAL YEARLY COST	\$ 22,356.77
	AVERAGE COST PER MBF	\$1.33

SELLING EXPENSE

Salary - one man per year	TOTAL YEARLY COST	\$ 6,000.00
	AVERAGE COST PER MBF	\$0.36

MANAGEMENT EXPENSE

2% Total Plant Investment

.02 (\$930,353.00)	TOTAL YEARLY COST	\$ 18,607.06
	AVERAGE COST PER MBF	\$1.11



9333.3 - PRODUCTION COSTS  
(Schedule 19)

EASTERN OREGON SAWMILL

2. Cost Summary.

a. Basic 1960 Cost Summary.

<u>COST SUMMARY</u>	
	<u>Yearly Cost</u>
Log Pond	\$ 21,841.85
Sawmill	115,176.28
Green Chain	23,642.66
Dry Kilns	31,268.02
Dry Sorter	32,708.64
Planing Mill	58,973.77
Yarding & Loading	74,267.91
Boiler Room	28,074.09
General Expenses	4,418.00
Utilities	22,356.77
General Overhead	129,017.14
Selling Expense	6,000.00
Management Expense	<u>18,607.06</u>
TOTAL YEARLY COST	\$566,352.19
AVERAGE COST PER MBF	$\frac{\$566,352.19}{16,800} = \$33.71$

9333.3 - PRODUCTION COSTS  
(Schedule 19)

EASTERN OREGON SAWMILL  
(Cost Development)

Schedule 18 - Average Cost Adjustment Factor - 1960 to 1972

Buildings and Wiring (1960 P. pine mill study)

Sawmill: Structure	\$ 42,800.00	
Wiring	8,000.00	
Plumbing	4,200.00	
Steam Pipe	4,200.00	
Air Cond.	130.00	\$ 59,330.00
Green Chain	6,000.00	6,000.00
Dry Kiln	30,000.00	30,000.00
Dry Sorter	24,000.00	24,000.00
Planing Mill	36,340.00	36,340.00
Yarding and Loading	51,200.00	51,200.00
Boiler Room	7,000.00	7,000.00
General Expenses		
Warehouse	10,000.00	
Office	25,000.00	
Toilets	4,200.00	
Primary wiring	1,100.00	
Primary Water pipe	3,500.00	
		<u>43,800.00</u>

\$257,670.00

Land and Equipment

Total Plant Cost	
(1960)	\$930,353.00
Less Buildings	
& Wiring Cost	<u>257,670.00</u>
	\$672,683.00

Buildings	\$257,670.00 x 1.809 = \$ 466,125.00	
Equipment and Land	<u>672,683.00</u> x 1.246 = 838,163.00	<u>1/</u>
	\$1,304,288.00 -	\$2,492.00
Physical Plant Cost	\$930,353.00	\$1,301,796.00

Average factor for cost adjustment for plant investment

$$\frac{1,304,288.00}{\$ 930,353.00} = 1.402$$

1/ Total Plant Investment excluding land under General Expenses  
\$2,000.00 x 1.246 = \$2,492.00

Schedule 19	\$ 466,125.00	35.7%
	<u>838,163.00</u>	<u>64.3%</u>
	\$1,304,288.00	100.0%



9333.3 - PRODUCTION COSTS  
(Schedule 19)

EASTERN OREGON SAWMILL  
(Cost Development)

Schedule 18 Costs (1972)

Depreciation Allowance - from 1960 P. pine mill study

Log Pond	\$ 1,325.00	
Sawmill	19,266.24	
Green Chain	827.03	
Dry Kilns	3,819.40	
Dry Sorter	1,665.92	
Planing Mill	6,418.30	
Yarding & Loading	9,446.04	
Boiler Room	5,014.06	
General Expense	1,063.00	
	<u>\$ 48,844.99</u>	(1960 Depreciation Expenses)
	x 1.402	(1960-1972 cost adjustment factor)
	<u>\$ 68,480.68</u>	Without barker and chipper
Chipper	\$ 1,234.13	
Debarker	<u>2,169.08</u>	(See below)
	\$ 71,883.89	(With debarker and chipper)

Debarker -

15.7 yrs. from D.fir \$27,777.02 use Douglas-fir milling cost data  
x 1.226 from Douglas-fir milling cost data  
\$34,054.63 ÷ 15.7 = \$2,169.08

Chipper

14.8 yrs. from D. fir \$14,898.17 use Douglas-fir milling cost data  
x 1.226 from Douglas-fir milling cost data  
\$18,265.16 ÷ 14.8 = \$1,234.13

Total (Debark & Chip) \$52,319.79

9333.3 - PRODUCTION COSTS  
(Schedule 19)

EASTERN OREGON SAWMILL  
(Cost Development)

(Schedule 18)

		Mill Operation Without Debarker & Chipper	Debarker and Chipper	Mill Operation With Debarker and Chipper
Maintenance				
Expenses		\$1,301,796.00	\$52,319.79	
4% physical plant	x	.04	.04	
cost		\$ 52,071.84	\$ 2,092.79	= \$54,164.63
Supplies		\$1,301,796.00	\$52,319.79	
.005% physical plant	x	.005	.005	
cost		\$ 6,508.98	\$ 261.60	= \$ 6,770.58
Taxes		\$1,304,288.00	\$52,319.79	
.02% physical plant	x	.02	.02	
cost		\$ 26,085.76	\$ 1,046.40	= \$27,132.16
Insurance		\$1,304,288.00	\$52,319.79	
.01% physical plant	x	.01	.01	
cost		\$ 13,042.88	\$ 523.20	= \$13,566.08



9333.3 - PRODUCTION COSTS  
(Schedule 19)

EASTERN OREGON SAWMILL  
(Cost Development)

(Schedule 18)

Updating Operation Expenses

Oil and Fuel Expenses		Saw and Knife	
Log Pond	\$1,785.60	--	
Sawmill	--	\$5,927.00	
Planing Mill	--	2,023.20	
Yarding and Loading	3,091.20	--	
	\$4,876.80	\$7,950.20	1960 operation expenses
	1.1941/	x 1.2461/	
	\$5,822.90	\$9,905.95	
		+ 2,465.73*	
		\$12,371.68	

\* Debarker \$ 480.00 Douglas-fir mill study --  
Chipper 1,531.20 Douglas-fir mill study  
\$2,011.20  
x 1.226 Douglas-fir mill study factor  
\$ 2,465.73

1/ BLS Index Factors

General Overhead

55% of Direct Labor Costs + 2% of investment in plant

\$200,745.60 (1960 labor costs) - \$4.675.20 (Setter's wage) = \$196,070.40

\$196,070.40 x .55 = \$107,838.72 x 1.681 (cost adj. factor) = \$181,276.89

\$930,358. (plant investment) x .02 = \$18,607.06

\$18,607.06 x 1.402 (cost adj. factor) = \$ 26,087.10

General Expenses without barker and  
chipper

\$ 207,363.99

Barker and Chipper

\$14,073.60 (labor) x .55 = \$7,740.48

\$52,319.79 x .02 = 1,046.40

\$ 8,786.88

\$216,150.87

Management Expenses

2% of Total Plant Cost

\$930,358. (plant investment) x .02 = 18,607.06

\$18,607.06 x 1.402 (cost adj. factor) = \$ 26,087.10

Barker and Chipper

\$52,319.79 (plant investment) x .02 =

1,046.40

\$ 27,133.50

9333.3 - PRODUCTION COSTS  
(Schedule 19)

EASTERN OREGON SAWMILL  
(Cost Development)

(Schedule 18)

<u>Yearly Variable Costs</u>	<u>Without Barker and Chipper</u>	<u>With Barker and Chipper</u>
Labor Costs	\$329,594.34	\$343,667.94
Direct Supervision	32,959.43	34,366.79
Payroll Overhead	57,349.41	59,798.22
Depreciation	68,480.68	71,883.89
Maintenance	52,071.84	54,164.63
Operating Supplies	6,508.98	6,770.58
Taxes	26,085.76	27,132.16
Insurance	13,042.88	13,566.08
Operation - Fuel & Oil	5,822.90	5,822.90
Saw & Knives	9,905.95	12,371.68
General Overhead	207,363.99	216,150.87
Utilities	24,905.44	25,880.14
Selling	10,500.00	10,500.00
Management	<u>26,087.10</u>	<u>27,133.50</u>
	\$870,678.70	\$909,209.38



9333.3 - PRODUCTION COSTS  
(Schedule 19)

EASTERN OREGON SAWMILL

(Schedule 18)

The total cost of milling lumber varies with the size of log and volume of timber processed. A portion of this total cost, however, is fixed. The preceding cost data has been divided into variable costs (those that vary with the size of log or the board foot volume) and fixed costs (those costs which remain constant for each thousand board feet of lumber processed) in the following manner:

Yearly Fixed Costs - Labor, direct supervision and payroll overhead in green chain, dry sorter, planing mill and yarding and loading divisions.

Labor

Department	Total Wages	
Green Chain	\$17,049.60	(1960 P. Pine mill study)
Dry Sorter	21,974.40	
Planing Mill	31,152.00	
Yarding & Loading	38,640.00	
	<u>\$108,816.00</u>	
	x 1.681	(1960-1971 wage increase factor)
	<u>\$182,919.70</u>	
Direct Supervision (10% of direct labor costs)	+ 18,291.97	
	<u>\$201,211.67</u>	
Payroll Overhead (17.4% of direct labor costs)	+ 31,828.07	
	Total Labor	\$233,039.74

Utilities

	\$ 22,356.77	
	x 1.114	(1960-1972 cost adj. factor)
	<u>\$24,905.44</u>	
Debarker and chipper - 33,652 kw-hr @ \$0.026 (avg. 3 plants - page 53 of Ponderosa Pine Milling Cost - 1960) = \$874.95 x 1.114 (1960-1971 cost adj. factor) =	974.70	
	Total Utilities	\$25,880.14

9333.3 - PRODUCTION COSTS  
(Schedule 19)

EASTERN OREGON SAWMILL  
(Application of Costs)

Depreciation, Maintenance and Operating Supplies

Department	Depreciation	Maintenance	Operating Supplies
Green Chain	\$ 827.03	\$ 711.00	\$ 88.88
Dry Sorter	1,665.92	1,789.32	223.67
Planing Mill	6,418.30	6,016.40	752.05
Yarding and Loading	9,446.04	9,989.60	3,091.20)
			331.90)
	<u>\$18,357.29</u>	<u>\$18,506.32</u>	<u>\$ 4,487.70</u>
(1960-1972 cost inc. adj. factor)	x 1.402	1.402	1.402
	<u>\$25,736.92</u>	<u>\$25,945.86</u>	<u>\$ 6,291.75</u>
Total Maintenance, Depreciation and Operating Supplies -			
			<u>\$ 57,974.53</u>
Yearly Fixed Costs - with bark. & chip			
			316,894.41
			- 974.70
without barker & chipper			<u>\$315,919.71</u>



9333.3 - PRODUCTION COSTS  
(Schedule 19)

EASTERN OREGON SAWMILL

b. Current 1973 Cost Adjustments

(1) Wage Rate and Manpower Costs.

(a) Basic Wage Rates. The average rate for the model mill was updated by use of Western Wood Products Association "Employment Summary" for West Coast Mills.

(b) Workmen's Benefits.

	<u>12 Month Ending:</u>	
	<u>August 1972</u>	<u>October 1973</u>
Health and Welfare	\$0.274	\$0.376
Paid Vacation	0.240	0.262
Paid Holidays	0.130	0.143
Pensions	<u>0.140</u>	<u>0.248</u>
	\$0.784	\$1.029
 Social Security	 \$0.216	 \$0.288

(c) Wage Adjustment Factor

	<u>12 Month Ending:</u>	
	<u>August 1972</u>	<u>October 1973</u>
Pond to Car Ave. base	\$4.056	\$4.433
Workmen's Benefits	0.784	1.029
Social Security	<u>0.216</u>	<u>0.288</u>
	\$5.056/hr	\$5.750/hr

Base Wage Rate Index

\$4.433/hr (WWPA 12 mos. Ending Oct. 1973) = 1.093  
\$4.056/hr (WWPA 12 mos. Ending Aug. 1972)

Adjusted Wage Rate Index

\$5.750/hr (WWPA 12 mos. Ending Oct. 1973) = 1.137  
\$5.056/hr (WWPA 12 mos. Ending Aug. 1972)

9333.3 - PRODUCTION COSTS  
(Schedule 19)

EASTERN OREGON SAWMILL

(2) Plant and Equipment Costs

(a) Machinery and Equipment. Factor obtained from Bureau of Labor Statistics, Report of Wholesale Prices and Price Indices.

	Index <u>June 1972</u>	Index <u>Dec. 1973</u>	Index <u>Factor</u>
General Purposes	122.7	130.7	1.065
Electrical	110.6	114.0	1.031
Miscellaneous	120.7	126.3	1.046

Average       $3.142/3 = 1.047$

(b) Building Index. Factor obtained from Boeckh Trends.

	Index <u>1972</u>	Index <u>Nov. Dec. 1973</u>	Index <u>Factor</u>
Buildings	486.9	543.7	1.117

(c) Petroleum Index. Factor obtained from Bureau of Labor Statistics, Report on Wholesale Prices and Price Indexes.

	Index <u>June 1972</u>	Index <u>Dec. 1973</u>	Index <u>Factor</u>
Refined Petroleum products	108.5	252.0	2.322

(d) Utility Index. Factor obtained from Bureau of Labor Statistics, Report on Wholesale Prices and Price Indexes.

	Index <u>June 1972</u>	Index <u>Dec. 1973</u>	Index <u>Factor</u>
Utility	121.5	135.9	1.118



9333.3 - PRODUCTION COSTS  
(Schedule 19)

3. Application of Costs to 1973 Base.

(1) Eastern Oregon Sawmill Yearly Operating Cost with Debarker and Chipper Included.

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
Building	8.9	X	1.117	=	.099	
Equipment	17.5	X	1.047	=	.183	
Wages	70.1	X	1.137	=	.797	
Petroleum	0.6	X	2.322	=	.014	
Utilities	2.9	X	1.118	=	.032	Schedule 18 Cost
100.0% Weighted Index					= 1.125	X \$ 909,209.38
					Schedule 19 Cost	= \$1,022,860.55

(2) Eastern Oregon Fixed Sawmill Cost with Debarker and Chipper.

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
Building	6.5	X	1.117	=	.073	
Equipment	12.1	X	1.047	=	.126	
Wages	73.5	X	1.137	=	.836	
Utilities	7.9	X	1.118	=	.088	Schedule 18 Cost
100.0% Weighted Index					= 1.123	X \$ 316,894.41
					Schedule 19 Cost	= \$ 355,872.42

(3) Eastern Oregon Sawmill Yearly Operating Cost without Debarker and Chipper.

	Schedule 18 Operating Cost in %	X	Increase Factor	=	Current Index	
Building	9.0	X	1.117	=	.100	
Equipment	17.2	X	1.047	=	.180	
Wages	70.3	X	1.137	=	.799	
Petroleum	0.7	X	2.322	=	.016	Schedule 18 Cost
Utilities	2.8	X	1.118	=	.031	
100.0% Weighted Index					= 1.126	X \$ 870,678.70
					Schedule 19 Cost	= \$ 980,384.22

9333.3 - PRODUCTION COSTS  
(Schedule 19)

(4) Eastern Oregon Fixed Sawmill Cost without Debarker and Chipper.

	<u>Schedule 18 Operating Cost in %</u>		<u>Increase Factor</u>		<u>Current Index</u>		
Building	6.5	X	1.117	=	.073		
Equipment	11.9	X	1.047	=	.125		
Wages	73.7	X	1.137	=	.838		
Utilities	7.9	X	1.118	=	.088		
	100.0% Weighted Index			=	1.124	X	\$ 315,919.71
			Schedule 19 Cost			=	\$ 355,093.75

Cost per M Log Scale

Yearly Fixed Costs	<u>\$355,872.42</u>	= \$21.18 fixed cost
Annual Production Log Scale	16,800	log scale with debarker and chipper
	<u>\$355,093.75</u>	= \$21.14 fixed cost
	16,800	log scale without debarker and chipper

Variable cost per minute

Costs vary with log size:

	<u>With Debarker &amp; Chipper</u>	<u>Without Debarker &amp; Chipper</u>
Total Variable Costs	\$1,022,860.55	\$980,384.22
Less fixed costs	- <u>355,872.42</u>	- <u>355,093.75</u>
	<u>\$ 666,988.13</u>	<u>\$625,290.47</u>
	115,200 min	115,200 min.
	\$ 5.79	\$ 5.42
Plus 10% delay factor	<u>.58</u>	<u>.54</u>
	\$ 6.37	\$ 5.96



9333.3 - PRODUCTION COSTS  
(Schedule 19)

EASTERN OREGON SAWMILL  
(Log Sawing Times)

Sawing Time and Milling Cost per MBF by Log Diameter

Log Diameter Inches	Sawing Time per Log Minutes	Lumber Tally MBF International 1/8 Log Scale -	Time per MBF Minutes	Variable Milling Cost per MBF @ \$3.176 per min.	Fixed Milling Costs per MBF	Total Milling Costs per MBF
6	.50	.022	22.73			
7	.60	.033	18.18			
8	.70	.044	15.91			
9	.80	.055	14.55			
10	.90	.072	12.50			
11	1.00	.088	11.36			
12	1.10	.105	10.48			
13	1.20	.127	9.45			
14	1.30	.149	8.72			
15	1.40	.177	7.91			
16	1.50	.199	7.54			
17	1.60	.227	7.05			
18	1.70	.254	6.69			
19	1.80	.287	6.27			
20	1.90	.320	5.94			
21	2.00	.354	5.64			
22	2.15	.392	5.48			
23	2.30	.431	5.34			
24	2.45	.470	5.21			
25	2.60	.508	5.12			
26	2.75	.553	4.97			
27	2.95	.597	4.94			
28	3.15	.646	4.88			
29	3.35	.696	4.81			
30	3.55	.746	4.76			
31	3.80	.796	4.77			
32	4.05	.851	4.76			
33	4.35	.906	4.80			
34	4.65	.967	4.81			

9333.3 - PRODUCTION COSTS  
(Schedule 19)

EASTERN OREGON SAWMILL  
(Sawmill Times)

<u>Time in Minutes</u> <u>Non-sawing operations</u>							<u>Time in Minutes</u> <u>Sawing operations</u>					Total Non-Sawing & Sawing Operations
Diameter	No. of Positions	Load Log	Set Slabs	Return (Only)	Turn	Average Time	No. Lines	Saw Slabs	Return & Set Line	Saw Line	Total Time	
6	2.00	.049	.050	.036	.051	.236	2.43	.070	.129	.092	.291	.527
7	2.00	.049	.050	.036	.051	.236	3.16	.076	.161	.120	.357	.593
8	2.00	.049	.050	.036	.051	.236	3.53	.068	.177	.143	.393	.629
9	2.15	.049	.054	.092	.059	.254	3.37	.075	.172	.152	.399	.653
10	2.92	.049	.073	.117	.069	.308	5.33	.105	.272	.203	.580	.833
11	3.42	.049	.086	.137	.087	.359	6.17	.109	.333	.253	.695	1.054
12	3.72	.049	.093	.149	.098	.369	7.41	.104	.378	.252	.764	1.153
13	3.94	.049	.099	.158	.106	.412	6.45	.138	.335	.271	.774	1.156
14	3.96	.049	.099	.158	.107	.413	8.66	.123	.455	.346	.954	1.367
15	3.96	.056	.099	.158	.104	.417	8.58	.143	.480	.369	.992	1.409
16	4.00	.056	.100	.160	.105	.421	9.47	.132	.483	.393	1.013	1.434
17	4.10	.056	.103	.164	.109	.432	10.50	.148	.536	.441	1.125	1.557
18	4.04	.056	.101	.162	.106	.425	11.98	.158	.647	.537	1.392	1.817
19	4.08	.056	.102	.163	.108	.429	12.33	.147	.669	.557	1.373	1.862
20	4.10	.076	.115	.160	.121	.472	14.92	.168	.806	.701	1.675	2.347
21	4.13	.076	.116	.161	.122	.475	13.05	.161	.692	.633	1.506	1.981
22	4.19	.076	.117	.163	.124	.480	13.39	.172	.710	.696	1.578	2.058
23	4.35	.076	.122	.170	.131	.499	13.92	.170	.780	.724	1.674	2.173
24	4.52	.076	.127	.176	.137	.516	16.87	.158	.911	.877	1.946	2.462
25	4.59	.097	.129	.197	.162	.535	17.00	.174	.935	.935	2.044	2.629
26	5.27	.097	.143	.207	.192	.604	18.71	.179	1.010	1.029	2.218	2.822
27	4.95	.097	.159	.213	.173	.627	19.33	.173	1.102	1.179	2.459	3.086
28	5.55	.097	.155	.229	.205	.676	19.50	.255	1.131	.975	2.361	3.057
29	5.13	.097	.144	.221	.186	.648	20.33	.215	1.199	1.037	2.451	3.099
30	5.22	.125	.177	.245	.279	.826	20.75	.204	1.121	1.266	2.591	3.417
31	5.23	.125	.178	.246	.279	.828	25.50	.282	1.581	1.607	3.470	4.293
32	5.00	.135	.170	.235	.244	.794	20.57	.215	1.230	1.240	2.675	3.469
33	5.55	.125	.169	.261	.300	.875	27.57	.250	1.635	1.909	3.792	4.667
34	5.30	.125	.197	.273	.317	.912	24.33	.261	1.703	1.679	3.643	4.555
35	6.00	.203	.240	.342	.495	1.230	32.00		1.856			

Average times for each operation were taken from the preceding computations and applied to the following formulas:

Time to Load Log x 1 = Time for Operation  
 Time to Set Slab x No. of Positions = Time for Oper.  
 Time to Return Only x No. of Positions = Oper. Time  
 Time to Turn x No. of Positions minus one = Oper. Time  
 Time Saw Slabs x No. Positions = Operating Time  
 Time Return & Set x No. Lines = Operating Time  
 Time Saw line x No. Lines = Operating Time  
 to determine operation times for each one inch diameter class.



9333.3 - PRODUCTION COSTS  
(Schedule 19)

PONDEROSA PINE SAWMILL

